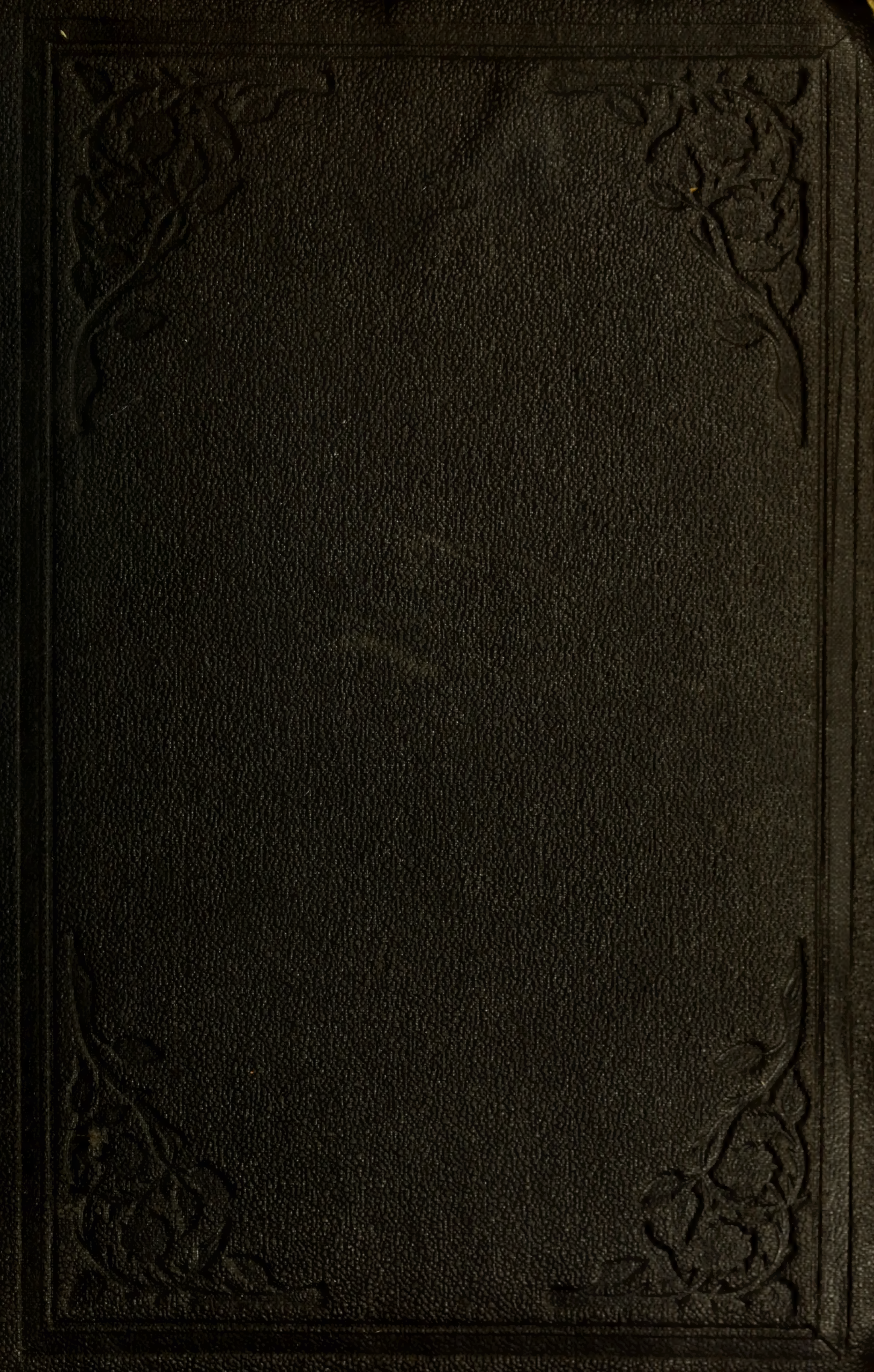

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ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR THE

PROVINCE OF ONTARIO

1890

PRINTED BY ORDER OF THE LEGISLATIVE ASSEMBLY.

AGRICULTURAL EXPERIMENT
UNIVERSITY OF ILLINOIS
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1891.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE.

1890

To His Honor the Lieutenant-Governor of Ontario :

The undersigned has the honor to present herewith the report of the Bureau of Industries (Agricultural Statistics), of the Agricultural College and Experimental Station (including the Experimental Union), of the Agriculture and Arts Association, of the Dairy and Creamery Associations, of the Fruit Growers' Association, of the Entomological Society, of the Clerk of Forestry and of the Bee-keepers' and Poultry Associations for the year 1890 ; also a list of Secretaries of Agricultural and other Societies and of Farmers' Institutes.

JOHN DRYDEN,
Minister of Agriculture

Toronto, July, 1891.

A.A. 2572

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I

THE BUREAU OF INDUSTRIES.

NINTH ANNUAL REPORT

OF THE

BUREAU OF INDUSTRIES.

PARTS I, II AND III.

To the Honorable Minister of Agriculture :

Sir,—I have the honor to present herewith Parts I, II and III of the ninth annual report of the Bureau of Industries, being the Agricultural Statistics of Ontario for the year 1890.

I have the honor to be, Sir,
Your obedient servant,

C. C. JAMES,
Secretary.

Toronto, June 16, 1891.

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PART I.

THE WEATHER AND THE CROPS.

THE WEATHER.

A record of the atmospheric conditions of any year will generally furnish the key to the history of the crops for that particular season. One does not need to be very observant to know the meaning of an unusual lack or a too abundant supply of rain at critical periods in the life of a crop, for the effects of the consuming drouth or the destructive "drowning out" are readily apparent. The amount of snowfall also plays a considerable part in agriculture, being either a blessing or a blight to fall wheat—sometimes sheltering and sometimes smothering, while the absence of the friendly covering not only exposes the young wheat plant to injury but also leaves unprotected many tender vines and bushes in the orchard and garden. The variations of temperature and the undue presence or absence of sunshine during the growing period are also important factors in the welfare of our crops. It will therefore be seen that the weather tables have an important bearing in helping to account for the results of a year's yield on the farms.

TEMPERATURE. In the following table the temperature for each of the six months constituting the growing period (April to September, inclusive) is given for ten stations which, geographically considered, may be reckoned as fairly representative, together with the average for the nine years 1882-90 :

Months.		Saugeen.	Birnam.	London.	Woodstock.	Stoney Creek.	Toronto.	Lindsay.	Gravenhurst	Ottawa.	Rockliffe.	Province average.
		°	°	°	°	°	°	°	°	°	°	°
April ...	1890...	38.92	43.16	46.09	43.72	46.09	42.31	40.33	38.83	39.64	36.08	41.52
	1882-90	38.37	41.95	42.78	41.64	42.56	40.65	38.92	37.50	39.38	36.31	40.01
May	1890...	47.07	50.80	53.91	51.63	52.26	50.01	48.57	48.37	50.31	47.11	50.00
	1882-90	49.31	54.04	54.78	53.51	53.41	51.94	52.31	51.72	55.25	50.85	52.71
June	1890...	62.53	66.30	66.67	67.95	69.34	65.31	65.42	65.77	64.37	62.57	65.62
	1882-90	59.40	63.88	64.46	64.44	64.95	62.39	62.89	62.46	65.40	60.76	63.10
July	1890...	65.46	67.47	67.21	68.23	71.64	67.34	66.02	66.88	67.42	64.18	67.19
	1882-90	63.76	67.65	68.26	68.14	70.26	67.49	66.37	66.34	68.83	64.43	67.15
August..	1890...	61.43	63.45	63.20	64.17	67.19	64.49	61.89	62.40	64.14	58.27	63.06
	1882-90	62.49	64.70	64.99	64.69	67.83	65.27	63.22	63.16	65.32	60.95	64.26
Sept'r ..	1890...	54.15	57.66	59.39	57.42	59.71	57.46	56.07	55.41	56.08	51.18	56.45
	1882-90	56.23	59.33	58.72	58.25	60.44	58.30	55.94	56.05	56.90	53.05	57.32
Aver. for 6 m'ths.	1890...	54.93	58.14	59.41	58.85	61.04	57.82	56.38	56.28	56.99	53.23	57.31
	1882-90	54.93	58.59	59.00	58.45	59.91	57.67	56.61	56.20	58.51	54.39	57.43

The average temperature of the province for the six months was .12° below that of the nine years. There was a higher record in London, Woodstock, Stoney Creek, Toronto and Gravenhurst compared with their respective averages for the nine years period, while Saugeen exactly equalled its own average. April was a comparatively warm month, every station excepting Rockliffe showing an increase in temperature, whilst that of the province exceeded its average for the nine years by 1.51°. May, on the contrary, was 2.71° cooler than usual, each station showing a drop ranging from .77° at London to 4.94° at Ottawa. June experienced a higher temperature than the average at every station excepting Ottawa. In July there were four stations higher and six lower than their own averages for the nine years, but the record for the province was .04° above its average for the series of years. The record for this the hottest month of the season was 67.19°. August was a colder month than usual at every station, and the temperature for September fell below its average, although London and Lindsay exceeded their figures for the nine years.

SUNSHINE. The table following gives the sunshine record at five stations for the six months April-September for 1889 and 1890, together with the averages for the eight years 1883-90. The hours of possible sunshine (calculated for Latitude 45°) will be found in the last column of the table.

Months.		Woodstock.	Toronto.	Barrie.	Lindsay.	Kingston.	Province averages.	Sun above horizon in Lat. 45°.
		Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.
April	1890....	199.0	229.3	169.1	223.4	229.0	210.0	406.4
	1889....	178.9	189.8	170.1	209.5	197.1	189.1	
	1883-90.	192.2	196.4	166.1	205.5	194.7	191.0	
May	1890....	182.6	184.7	143.7	172.6	189.0	174.5	461.1
	1889....	197.1	202.3	197.6	198.3	204.1	199.9	
	1883 90.	202.6	220.5	195.0	218.4	215.8	210.5	
June	1890....	253.5	265.7	238.4	252.8	263.3	254.7	465.7
	1889....	169.3	181.3	111.7	171.9	187.9	164.4	
	1883-90.	239.4	263.3	226.3	257.3	244.7	246.2	
July	1890....	289.8	304.3	243.1	272.9	292.0	280.4	470.9
	1889....	274.1	303.2	271.2	298.4	274.6	284.3	
	1883-90.	268.2	289.6	255.8	280.9	269.4	272.8	
August......	1890....	240.5	249.5	218.7	229.7	234.8	234 6	434.5
	1889....	240.7	229.8	215.6	229.3	222.9	227.6	
	1883-90.	230.6	253.7	214.7	236.1	248.2	236.6	
September...	1890....	197.2	209.4	169.5	210.2	189.4	195.2	376.3
	1889....	189.8	203.9	159.2	198.9	177.6	185.9	
	1883-90.	198.3	212.4	143.5	205.2	198.7	191.6	
Totals....	1890....	1,362.6	1,442.9	1,182.5	1,361.6	1,397.5	1,349.4	2,614.9
	1889....	1,249.9	1,310.3	1,125.4	1,306.3	1,264.2	1,251.2	
	1883-90.	1,331.3	1,435.9	1,201.4	1,403.4	1,371.5	1,348.7	

The number of hours of sunshine registered in the province for the six months was barely 52 per cent. of the possible, but it was .7 of an hour more than the average for the eight years 1883-90. Barrie and Lindsay fell below their average, but the other three stations more than made up for the loss. The highest record of sunshine was that of Toronto, which was 1,442.9 hours, or 93 5 more than the average for the province. The least sunshine was registered at Barrie. May fell greatly behind its record of last year and also its figures for the eight years. July had less sunshine than in 1889, but more than its average for the series of years. August exceeded its record of 1889, but did not equal its average for the eight years. April and June, however, each surpassed their records, both for the previous year and their average for the series of years.

PRECIPITATION. As has already been pointed out the matter of precipitation during the winter months is of importance from an agricultural standpoint, more particularly to winter crops. The following table gives the fall of rain and snow by districts during the five winter months for 1888-9 and 1889-90 and the average for the nine years 1882-90 :

Months.		West and South-west.		North-west and North.		Centre.		East and North-east		Province averages.	
		Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.	Rain.	Snow.
		Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.
November......	1889...	2.91	9.1	1.76	13.6	2.53	9.1	2.29	12.3	2.37	11.0
	1888...	2.79	1.7	2.87	8.3	2.70	2.0	3.25	3.5	2.90	3.9
	1882-9.	2.37	6.6	2.08	14.8	2.17	5.8	1.97	9.6	2.15	9.2
December......	1889...	3.99	0.3	2.35	13.2	4.01	2.1	2.45	9.5	3.20	6.3
	1888...	1.24	5.4	1.14	8.5	0.95	3.2	1.00	5.6	1.08	5.7
	1882-9.	1.59	14.3	1.24	21.8	1.53	11.7	1.15	14.8	1.38	15.6
January........	1890...	3.44	4.7	1.93	25.5	2.78	8.9	2.19	12.6	2.59	12.9
	1889...	1.78	16.0	0.90	26.6	1.53	20.7	1.52	24.4	1.43	21.9
	1882-90	1.38	16.8	1.11	29.8	1.34	18.4	1.06	22.4	1.22	21.9
February	1890...	1.82	6.2	0.85	20.7	1.88	9.1	1.86	15.4	1.60	12.9
	1889...	0.41	19.8	0.18	30.6	0.31	16.8	0.15	27.1	0.26	23.5
	1882-90	1.68	11.2	0.73	22.4	1.34	11.7	0.85	18.8	1.15	16.0
March	1890...	1.05	11.1	0.59	17.5	0.86	10.8	0.74	13.1	0.81	13.1
	1889...	0.29	6.2	R.	6.9	R.	8.3	R.	4.5	0.08	6.5
	1882-90	1.24	10.7	0.85	14.4	1.09	10.0	0.85	14.2	1.01	12.3
Total	1890...	13.21	31.4	7.48	90.5	12.06	40.0	9.53	62.9	10.57	56.2
	1889...	6.51	49.1	5.09	80.9	5.49	51.0	5.92	65.1	5.75	61.5
	1882-90	8.26	59.6	6.01	103.2	7.47	57.6	5.88	79.8	6.91	75.0

As one inch of rain is equal to about ten inches of snow the total precipitation of the province exceeded that of the previous year and also the average for the nine years. The rainfall during the five months was remarkably heavy, being nearly double that of the previous year, and 53 per cent. more than the average for the nine years. In the west and south-west and centre districts the fall of rain was especially great. There were 3.20 inches of rain recorded for the province in December, which was the wettest month, 2.59 in January and 2.37 in November, while in March only .81 inches fell. In the centre district in December 4.01 inches of rain were registered, and in the west and south-west 3.99 inches. The snowfall of the province was 5.3 inches below that of the previous year, and 18.8 inches below the average for the nine years. In no district did the snowfall equal its average for the series of years, and in the north-west and north only was the fall of snow greater than in 1888. The heaviest precipitation of snow was experienced in March, being 13.1 inches, while January and February are bracketted for second place with 12.9 inches. There was more snow in November and March than in the previous year or as compared with the average of the period of years for the respective months, but the midwinter months are greatly behind in their record of snowfall. The effects of the comparatively light fall of snow in December and January can be traced in the report of the condition of the fall wheat crop as it came out of the winter, more particularly in the west and south-west district, where the snowfall was but 0.3 inches in December as compared with an average of 14.3 for the nine years, and 4.7 inches in January as against 16.8 inches for the period.

NOTE.—The weather districts given in these tables are those of the Meteorological Office. The Centre is a circular district whose centre is a point in lake Ontario, about midway between Toronto and the mouth of the Niagara river, and embracing the counties of Welland, Lincoln, Wentworth, Halton and Peel, and portions of York, Ontario and Durham. A line drawn from the circumference of the circle through Guelph to Goderich is the limit between the West and South-west and the North-west and North districts, and a line from lake Scugog to Rockliffe, on the Ottawa river, is the limit between the North-west and North and the East and North-east districts.

The rainfall during the growing season, however, is of paramount inportance, and the following table furnishes an interesting study:

Month.	West and South-west.		North-west and North.		Centre.		East and North-east.		Province averages.	
	1890.	1882-90.	1890.	1882-90.	1890.	1882-90.	1890.	1882-90.	1890.	1882-90.
	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.
April	2.52	1.71	2.04	1.39	1.94	1.58	1.80	1.40	2.07	1.52
May	4.30	3.35	2.88	2.64	3.05	2.73	2.72	2.51	3.24	2.81
June	4.48	3.43	3.15	2.90	4.14	3.16	3.23	2.88	3.75	3.09
July	2.06	2.51	3.38	2.48	2.24	2.30	3.47	2.89	2.79	2.55
August........	2.91	2.68	3.28	2.58	3.09	2.32	3.59	2.63	3.22	2.55
September.....	1.71	2.34	2.21	2.97	2.04	2.42	2.16	2.57	2.03	2.57
Totals...	17.98	16.02	16.94	14.96	16.50	14.51	16.97	14.88	17.10	15.09

The precipitation was 2.01 inches greater in the six months than the average for the same time in the nine years 1882-90. Every district showed an increase in this respect. Each month also showed a greater rainfall, with the exception of September. June was the wettest month, 3.75 inches of rain falling, May came next with 3.24 inches, and August was third with 3.22 inches. In September only 2.03 inches were recorded, and in April the figures were but little higher, although considerably in excess of its own average. The rainfall for the six months was greatest in the west and south-west district and least in the centre district.

FARM LANDS OF THE PROVINCE.

Rural Areas Assessed. The figures given in the following table are for townships which are municipally organised, and are compiled from the assessors' returns. The acreage assessed and the acreage of woodland, swamp and waste land are for 1890, and the acres cleared are given for 1889 and 1890, the whole being presented by county groups and for the province:

Districts.	Acres assessed.			Acres cleared.		Acres woodland.	Acres swamp, marsh or waste.	Per cent. cleared.
	Resident.	Non-resident.	Total.	1890.	1889.			
Lake Erie	2,277,963	57,854	2,335,817	1,397,825	1,366,784	833,499	104,493	59.8
Lake Huron	2,211,600	63,249	2,274,849	1,328,701	1,301,764	735,835	210,313	58.4
Georgian Bay....	1,926,367	86,176	2,012,543	1,041,859	1,027,155	774,631	196,953	51.8
West Midland ..	3,210,114	40,139	3,250,253	2,293,009	2,271,604	657,430	299,814	70.5
Lake Ontario....	3,004,561	39,981	3,044,542	2,300,619	2,270,818	505,365	238,558	75.6
St. Law. & Ottawa	5,001,864	271,610	5,273,474	2,301,436	2,284,429	2,152,671	819,367	43.6
East Midland....	2,471,635	177,554	2,649,189	839,472	824,450	1,428,118	381,599	31.7
North'n Districts.	1,351,022	226,592	1,577,614	155,778	138,104	1,255,898	165,938	9.9
The Province { 1890	21,455,126	963,155	22,418,281	11,658,699	....	8,343,447	2,416,135	52.0
{ 1889	21,294,019	984,619	22,278,638	....	11,485,108	8,451,181	2,342,349	51.5

The assessed rural area of the province is now 22,418,281 acres, which is an increase of 139,643 acres over the figures of the previous year. Several townships became organised in 1890, and the increase in area assessed in the Northern Districts is 170,305 acres. The acreage of non-resident land is less than in 1889 by 21,464. There are 11,658,699 acres cleared, which is 173,591 additional to that recorded in the previous year, and an increase which is shared by every group. The total increase in cleared lands since 1882, according to the assessors' returns, was 1,485,987 acres or 165,110 acres annually. The highest percentage of cleared land is observed in the Lake Ontario counties, where it rises to 75.6, and the West Midland group comes next with 70.5 per cent. Only 9.9 per cent. is credited to the Northern Districts. The average for the province is 52.0 per cent., which is .5 more than the figures of 1889. The area in swamp, marsh, and waste lands shows an increase. This item has been very imperfectly taken by the assessors and further additions may be expected yearly until errors from this source are eliminated. This specially applies to the newer portions of the province.

AREA IN CROPS. The following table shows the number of acres under staple field crops for each of the five years 1886-90, together with the averages for the last six and nine years. The column for 1885-90 is retained to keep the table uniform with that showing values in Part III. :

Field Crops.	1890.	1889.	1888.	1887.	1886.	1885-90.	1882-90.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Fall wheat	720,101	822,115	826,537	897,743	886,402	838,006	908,723
Spring wheat	601,753	398,610	367,850	484,821	577,465	538,327	569,426
Barley	701,326	875,286	895,432	767,346	735,778	762,174	764,365
Oats	1,882,366	1,923,444	1,849,868	1,682,463	1,621,901	1,750,631	1,643,490
Rye	103,061	90,106	84,087	68,362	67,779	81,948	107,610
Pease	781,206	708,068	696,653	726,756	703,936	710,450	659,685
Corn	223,836	187,116	222,971	163,893	156,494	187,024	190,855
Buckwheat	90,111	56,398	57,528	64,143	70,792	66,791	64,936
Beans	39,456	21,830	22,700	20,275	21,072	24,998	24,506
Potatoes	158,094	145,812	153,915	140,283	140,143	149,665	154,919
Mangel-wurzels	25,953	21,211	21,459	17,924	18,170	20,192	19,167
Carrots	11,977	11,261	11,524	9,110	9,267	10,360	10,486
Turnips	111,055	111,103	113,188	105,322	98,931	106,983	102,595
Hay and clover	2,462,002	2,386,223	2,292,638	2,280,643	2,295,151	2,330,791	2,261,664
Total	7,912,297	7,758,583	7,616,350	7,429,084	7,403,281	7,578,340	7,482,427

The steady increase in the total acreage of the staple crops of the province has been continued, the area being 7,912,297 acres, or 153,714 acres more than that of 1889, and considerably above that of any other year. The acreages of fall wheat and barley are less than in any year of the table, while spring wheat has made a tremendous spread compared with the area recorded for the three or four immediately previous. The area of oats, while less than in 1889, exceeds that of any other year. Rye has a wider area than in any of the years 1886-90, but it does not equal its average for the nine years. The remainder of the crops show greater acreages both as compared with the previous year and with their averages for the nine years 1882-90.

These crops together with pasture comprise about 90 per cent. of the cleared land, leaving one-tenth of the improved land to be devoted to orchard and garden, minor crops, etc.

The area devoted to the crops named in the preceding table (and for similar average periods) is here presented by groups of counties :

Year.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1890..........	996,955	851,934	696,361	1,539,165	1,669,314	1,474,437	569,117	115,014	7,912,297
1889..........	949,859	812,757	719,473	1,481,308	1,667,961	1 450,920	582,343	93,962	7,758,583
1888..........	958,486	801,218	690,243	1,489,263	1,635,315	1,402,502	551,102	88,221	7,616,350
1887..........	932,076	781,833	656,184	1,455,376	1,609,981	1,371,322	539,460	82,852	7,429,084
1886..........	920,626	772,120	647,156	1,426,069	1,597,507	1,396,090	562,249	81,464	7,403,281
Average—									
1885-90	946,233	797,097	676,022	1,473,154	1,626,271	1,410,549	558,242	90,772	7,578,340
1882-90	927,502	780,734	666,086	1,460,168	1,614,649	1,390,527	556,620	86,141	7,482,427

The Georgian Bay and East Midland counties are the only groups which fall behind their acreages of the previous year, but all the districts in the table show an increase compared with their respective averages for the terms of six and nine years.

Area in Pasture.—The area in pasture is given in the appended table by county groups and for the province for each of the four years 1887-90, and also the rate of pasture land per 100 acres cleared in 1890 :

Year.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1890	246,107	339,984	214,561	513,612	369,063	641,597	195,303	21,865	2,542,092
1889................	249,623	319,428	221,087	511,618	410,416	685,401	191,194	19,195	2,607,962
1888..........	239,330	307,879	213,925	504,840	406,620	665,139	179,823	18,048	2,535,604
1887................	240,586	296,316	204,903	512,349	404,893	667,034	186,850	16,008	2,528,939
Per cent. of cleared land in 1890	17.6	25.6	20.6	22.4	16.0	27.9	23.3	14.0	21.8

The Lake Huron, West Midland and East Midland groups and the Northern Districts show an increase in the area of pasture land, but the decrease recorded in the other four groups is heavier, the result being a shrinkage of 65,870 acres in the total area in pasture of the province compared with the previous year. The ratio of pasture to cleared land is 21.8 per cent. for the province, ranging from 14.0 in the Northern Districts to 27.9 in the dairying counties of the St. Lawrence and Ottawa group. The figures for these years do not include "bush" pasture.

PROPORTIONAL AREAS UNDER CROP. The relative distribution of the various crops per 1,000 acres of cleared land is given in the following tables by county groups for the years 1889 and 1890, together with the averages for the nine years 1882-90:

Districts.		Fall Wheat.	Spring Wheat.	Barley.	Oats.	Rye.	Pease.	Corn.	Buckwheat.	Beans.	Hay and Clover.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.	Total.
Lake Erie ...	1890	138.6	16.8	33.7	132.9	10.0	60.2	71.5	8.6	21.7	205.0	10.5	1.2	.7	1.8	713.2
	1889	153.3	4.3	29.3	135.3	9.6	52.6	62.4	6.4	11.0	217.0	9.7	1.2	.6	2.1	694.8
	'82-90	170.6	9.6	30.1	127.7	9.3	47.3	72.6	7.8	12.7	211.0	12.4	1.0	.6	1.7	714.4
Lake Huron .	1890	81.1	22.8	49.9	168.4	1.3	79.0	10.2	1.8	.6	203.7	9.6	2.5	.8	9.5	641.2
	1889	97.7	9.2	53.7	167.3	.8	68.1	7.6	.6	.4	197.5	8.8	2.0	.8	9.9	624.4
	'82-90	122.2	30.3	51.7	151.0	.8	67.5	8.5	1.0	.5	194.8	10.7	2.0	.8	10.5	652.3
Georgian Bay	1890	64.0	67.7	44.5	170.5	3.9	82.6	3.2	1.5	.4	201.4	13.6	1.2	1.1	12.8	668.4
	1889	79.4	52.6	58.8	187.7	2.8	83.8	2.0	.5	.2	205.7	12.6	.7	1.0	12.7	700.5
	'82-90	82.0	77.1	55.0	156.9	3.0	79.8	1.6	.7	.3	195.7	14.0	1.0	1.1	12.6	680.8
West Midland	1890	84.9	31.4	62.0	177.5	2.5	74.5	14.7	1.3	.4	189.1	12.1	3.9	1.1	15.8	671.2
	1889	93.4	14.2	69.1	177.2	2.4	68.1	12.2	.8	.3	184.6	10.2	3.2	1.0	15.4	652.1
	'82-90	117.1	35.9	61.2	155.4	2.3	62.1	12.9	1.1	.6	186.5	12.2	2.9	1.0	15.9	667.1
Lake Ontario.	1890	53.5	85.0	111.6	142.2	12.3	78.8	15.1	11.9	1.1	181.5	14.6	2.6	1.3	14.1	725.6
	1889	64.4	54.0	155.3	143.1	13.4	71.7	14.0	7.8	.8	178.2	13.4	2.5	1.4	14.5	734.5
	'82-90	71.4	74.2	131.7	127.8	14.6	67.6	13.4	7.4	.9	181.4	14.1	2.3	1.3	13.0	721.1
St. Lawrence and Ottawa.	1890	4.3	54.6	34.6	178.8	12.9	37.2	12.5	14.5	1.6	268.7	16.7	1.1	.9	2.3	640.7
	1889	5.5	46.6	44.4	191.5	9.7	36.1	9.5	9.7	1.3	260.7	16.6	.8	.7	2.0	635.1
	'82-90	7.6	54.3	44.1	176.3	15.8	42.8	8.8	12.8	1.5	255.3	17.8	.8	.7	1.9	640.5
East Midland	1890	27.7	91.5	72.4	146.4	22.5	66.8	11.4	11.2	.9	200.8	15.1	2.7	1.2	7.3	677.9
	1889	39.2	71.4	111.9	168.7	17.1	63.2	10.2	5.5	.6	190.6	16.1	1.8	1.1	8.9	706.3
	'82-90	34.4	92.9	104.6	145.7	23.5	64.4	9.0	7.0	.7	192.5	15.5	1.5	1.0	7.1	699.8
Northern Districts ...	1890	5.8	47.8	14.3	171.7	5.8	78.4	2.5	6.3	.7	363.9	25.7	.3	1.2	13.9	738.3
	1889	5.3	50.7	11.7	187.3	7.4	75.3	2.9	2.9	.8	348.6	25.0	.6	1.1	18.0	737.6
	'82-90	4.9	77.4	15.8	163.4	8.2	72.0	3.0	4.6	.7	362.6	25.6	.7	1.2	18.3	758.4
The Province.	1890	61.8	51.6	60.2	161.5	8.8	67.0	19.2	7.7	3.4	211.2	13.6	2.2	1.0	9.5	678.7
	1889	71.6	34.7	76.3	167.6	7.9	61.7	16.3	4.9	1.9	208.0	12.7	1.8	1.0	9.7	676.1
	'82 90	82.7	51.9	69.6	149.7	9.8	60.1	17.4	5.9	2.2	205.9	14.1	1.7	1.0	9.3	681.3

The figures for the province show that out of every 1,000 acres cleared 678.7 are under crops specified, an increase of 2.6 acres compared with the ratio of the previous year, yet 2.6 less than the average for the nine years. The Georgian Bay, Lake Ontario and East Midland groups fall below their respective figures for 1889, and the West Midland, Lake Ontario and St. Lawrence groups are the only districts which surpass their proportion per 1,000 acres for the term 1882-90. For the province a decrease over the previous year is noticed in three staple crops, fall wheat, barley and oats, and also in turnips, carrots remaining the same, while every other crop shows an increase. The Lake Erie counties lead the other groups in the proportional area of fall wheat, corn and beans, the Georgian Bay in pease, the West Midland in mangel-wurzels and turnips, the Lake Ontario in barley and carrots, the St. Lawrence and Ottawa in oats and buckwheat, the East Midland in spring wheat and rye, while the Northern Districts, as usual, are away ahead in hay and clover and potatoes.

FALL WHEAT.

Correspondents writing in November, 1889, stated that owing to the drouth the condition of the ground was such that it was next to impossible to prepare stubble land for seeding. The most unfavorable reports came from the south-western counties, where the land had been exceedingly dry, hard and lumpy. It was stated, also, that a considerable portion of the seed had failed to germinate owing to a lack of sufficient moisture. A better tone was apparent in the reports from the midland and eastern counties, as there the soil was generally in good condition at seeding, and summer fallowed lands were looking very well. The young wheat was regarded as fairly healthy, but rather backward owing to slow growth, and fears were expressed that it had hardly made sufficient head to enable it to stand the rigors of winter. The presence of the wire-worm was occasionally mentioned in some of the eastern counties. In the spring the crop was reported as presenting a very uneven condition throughout the province. Some fields were exceptionally fine and others unusually poor in the same township and sometimes on the same farm, according to the soil, cultivation and physical aspect of the country.

The May bulletin contained the following summary of the condition of the crop: Throughout the west seeding was driven late into the fall on account of the drouth, and the acreage was somewhat reduced thereby. When winter set in the crop had hardly made sufficient headway to stand the alternate freezing and thawing of the mild winter which followed, with insufficient snow to protect the young plants. On this account the crop suffered more or less from winter-killing, and in the extreme west it was uneven and poor. Considering all these unfavorable conditions, however, the crop in other portions of the province may be said to have wintered better than was expected, particularly in Huron, Bruce and Brant, but the night frosts and cold, dry northerly winds and rains, commencing in February and continuing late into the spring, played havoc with the crop and greatly reduced its vitality and retarded its growth. On low, loamy soils the condition of the crop was very unpromising on account of the action of the frost, being patchy and delicate, but on light, rich loams where well underdrained, and especially where protected by bush or the lay of the land, and where the crop was got in early and the land well prepared, it generally presented a fine appearance. This was especially the case in Norfolk, Welland, Huron, Brant and a few other counties, while the worst reports came from Essex, Kent, Lambton, Lincoln and Halton. In these latter counties, Essex and Lambton more particularly, considerable fall wheat land was plowed up and seeded anew, and in many instances spring wheat was harrowed into bare patches amongst the fall wheat. The crop was considered backward in May, but little or no injury from insects had been reported.

A more cheerful state of affairs was outlined in the August bulletin, which reported that fall wheat throughout almost the whole of Western Ontario was of good quality and in every respect an unusually fine crop. In the Georgian Bay, Lake Huron and West Midland counties the crop was almost invariably reported good, notwithstanding the loss by winter-killing. In the counties east of Kingston and along the Ottawa river, where the acreage is rather small, the reports regarding both yield and quality were encouraging. While the great majority of correspondents made no mention of damage to the crop by drouth or insects, reports of slight injury by weevil and midge were made by a few correspondents in nearly every section of the province. The excessive rains of spring were followed by great heat, which brought on such a rush of growth that much rust and shrinkage was expected, but the damage was said to be slight, and it was thought that the sample would not be materially affected. The berry was generally reported plump, the straw bright and the crop the best for years. Cutting began from the 10th to the 15th of July in the more advanced counties, from the 15th to the 20th throughout most of western Ontario, and from the 25th of July to the 1st of August in the district east and north of Kingston. Harvesting weather was very favorable and the crop was housed in excellent condition.

In the reports sent in by correspondents in November the quality of fall wheat was more favorably commented upon than that of any other cereal, and many instances were given where the grain had gone some pounds per bushel over the standard weight. The actual results of the threshing, however, showed that the crop did not average quite as high a yield per acre as was expected at the time of cutting. The following table shows the acreage and yield by county groups and for the province in each of the years 1889 and 1890, together with the average for the nine years 1882-90:

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie	193,716	3,635,817	18.8	209,474	3,155,221	15.1	221,505	4,084,244	18.4
Lake Huron..........	107,765	2,247,001	20.9	127,201	1,811,876	14.2	146,249	2,825,766	19.3
Georgian Bay	66,705	1,206,527	18.1	81,508	1,336,949	16.4	80,232	1,622,787	20.2
West Midland........	194,682	4,289,221	22.0	212,155	3,264,999	15.4	256,339	5,056,093	19.7
Lake Ontario.........	123,101	2,308,261	18.8	146,250	2,686,377	18.4	159,930	3,205,887	20.0
St. Law. and Ottawa..	9,952	159,925	16.1	12,521	231,359	18.5	16,543	296,073	17.9
East Midland.........	23,276	404,429	17.4	32,329	504,664	15.6	27,371	534,163	19.5
Northern Districts....	904	16,202	17.9	677	10,420	15.4	554	10,527	19.0
Totals......	720,101	14,267,383	19.8	822,115	13,001,865	15.8	908,723	17,635,540	19.4

The area of fall wheat in the province in 1890 is only 721,101 acres, being 102,014 less than that of the previous year and 188,622 less than the average for the nine years 1882–90—a very heavy decrease in so important a crop. The falling off in acreage is general, being observed in every group except the Northern Districts, where the area is a trifling one at the best. The average yield per acre of the province, however, is a very good one, being 19.8 bushels, or 4 bushels more than the figures for the nine years, and 4.0 bushels more than the average yield for 1889. To this last fact is due the result that notwithstanding the great shrinkage in acreage the total yield for the province is 1,265,518 bushels more than that of 1889, although it falls greatly below the average gross yield for the nine years. The West Midland group, which has the largest acreage, also has the best yield per acre, the average for these counties being 22.0 bushels. The St. Lawrence and Ottawa group gives the lowest average yield, being only 16.1 bushels per acre. The Lake Erie, Lake Huron and West Midland groups each exceed their total yield of the previous year, and so, of course, do the newer Northern Districts, but not one of the old groups equals its average total yield for the nine years period.

THE NEW CROP OF FALL WHEAT. There has been a considerable increase in acreage, and the condition of the ground at the time of sowing, except on clay land which was rather dry and stiff, was most suitable for a good start. The general appearance of the fields as correspondents wrote was such as to evoke frequent expressions of admiration. The chief cause for fear lay in the fact that the plant had made rather too rank a growth. Scattering mention was made of injury by the Hessian fly on early sown fields, and the wire worm and white grub were reported in a few localities, but the prevailing opinion was that a better outlook for the new crop of fall wheat had never been reported during the first week of November.

SPRING WHEAT.

The August bulletin, which was made up from reports sent in on or before the 12th of that month, stated that it would not be safe at that date to assert that the crop of spring wheat would be better than an average, for although the figures submitted as the anticipated yield averaged slightly above the standard, the reports of the condition of the crop by the same authorities were not so encouraging. When correspondents wrote harvesting had not been completed except in a very few of the more advanced townships, while in the counties where most of the spring wheat is grown a large proportion of the grain was at least a week from maturity, and its condition depended much upon the state of the weather between that time and the harvest. A majority of the correspondents declared the crop to be "fair" or "promising," and generally good on high land, but there was an almost unanimous complaint of much injury to low-lying wheat from the wet, cold and late spring. In some localities a blight which reddened the leaves was complained of, and in the central counties midge and weevil were accredited with doing much damage, but the majority of reports agreed that the crop had suffered but little from insects or drouth. The bearded varieties, especially Colorado, seemed to be most in favor, and White Russian, French Imperial and Wild Goose were more commended than the Fyfe seed wheats, whether of Scotch or Manitoba growth.

The November bulletin had a lugubrious tone when it spoke of spring wheat. It stated that the crop was a comparative failure, for while in some cases a good yield of fair quality was reported, the majority of correspondents spoke of a light return much below the standard weight. In the lake districts the midge did injury in addition to rust, and in the St. Lawrence and Ottawa counties the joint worm left evil effects. The following table gives figures of acreage and yield for 1889 and 1890, and also the average for the nine years 1882-90 :

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie	23,548	310,647	13.2	5,911	85,803	14.5	12,421	181,356	14.6
Lake Huron	30,245	469,332	15.5	11,966	149,081	12.5	36,262	501,582	13.8
Georgian Bay........	70,508	934,079	13.2	54,014	737,749	13.7	75,406	1,092,334	14.5
West Midland	72,049	1,192,801	16.6	32,206	426,573	13.2	78,662	1,164,069	14.8
Lake Ontario........	195,498	2,323,621	11.9	122,676	1,841,946	15.0	166,151	2,638,523	15.9
St. Law. and Ottawa.	125,660	1,407,723	11.2	106,498	1,559,737	14.6	117,826	1,884,084	16.0
East Midland	76,801	936,894	12.2	58,882	782,276	13.3	73,905	1,060,093	14.3
Northern Districts ..	7,444	108,808	14.6	6,457	114,542	17.7	8,793	157,786	17.9
Totals..........	601,753	7,683,905	12.8	398,610	5,697,707	14.3	569,426	8,679,827	15.2

An increase in the acreage of this crop is seen in every county group, the area of spring wheat in the province being 203,143 acres more than in 1889, or an increase of 51 per cent. Although the acreage is larger than the average for the nine years, the small yield of 12.8 bushels per acre in 1890 does not permit the total yield of the province to equal its average for the period of 1882-90, for which term the average yield per acre was 15.2. The total yield of 1890, however, is 1,986,198 bushels more than that of the previous year. The best average yield is noted in the West Midland counties, being 16.6 bushels, and in the Lake Huron group the average is 15.5 bushels, but the Lake Ontario, St. Lawrence and Ottawa and East Midland groups fall below the average for the province. Notwithstanding a largely augmented acreage there is a falling off in the total yields of the St. Lawrence and Ottawa group and the Northern Districts compared with their respective yields of the previous year.

BARLEY.

Although the report concerning barley contained in the August bulletin was more or less anticipative, it proved to be so accurate in the main that it is here quoted in full: "Barley is somewhat light in yield and uncertain in color, so that taking into account the decreased area under cultivation the crop is likely to be 4,000,000 bushels less than the average, and probably not a great deal will rank firstclass. The wet, cool spring followed by the dry, hot weather at maturing time did a considerable amount of damage to this cereal, and unfortunately as the harvesting weather has been somewhat unfavorable in many localities, the grain has been discolored by rain both before and after cutting. The early varieties escaped this misfortune to a large extent, but otherwise the crop has suffered very generally to a greater or less degree. But a large proportion of the crop had still to be cut at the time of reporting, and it is difficult to state its precise condition in this respect. This was largely the case in the northern and eastern counties of the province, and it is to be hoped that the harvest has there been secured in a satisfactory condition. Reports respecting the imported two-rowed barley—of which small samples were sown by many farmers—are perhaps about equally divided for and against. It has been ascertained that this variety is from a week to ten days later in maturing than the ordinary six-rowed barley, but as it had been cut in hardly a single instance it was difficult to express a definite or reliable opinion upon it, and the reports are very guarded in this respect. So far however the evidence does not warrant the belief that it is in any marked degree superior to the ordinary varieties, in spite of the fact that it has been favored by a season of unusual rainfall and slow growth."

The November bulletin confirmed the reports of a considerable discoloration of barley, more especially among the late sown. In that bulletin, also, it was stated that there was a divided house on the question of the two-rowed barley which was being tested for the British market. While a few glowing accounts were given as to yield and quality, by far the greater number of returns classed it as no better than the six-rowed variety, and it has the disadvantage of taking from a week to ten days longer to mature. The result of the threshing proved that the yield was even lighter than was anticipated in August. Following is a comparison of acreage and yield by county groups and for the province for 1889, 1890 and the nine years 1882-90:

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie	47,045	966,480	20.5	40,070	964,925	24.1	39,041	959,400	24.6
Lake Huron	66,347	1,613,851	24.3	69,908	1,734,729	24.8	61,895	1,643,581	26.6
Georgian Bay	46,358	1,119,210	24.1	60,443	1,535,281	25.4	53,823	1,358,320	25.2
West Midland	142,206	3,806,364	26.8	156,880	4,533,985	28.9	134,015	3,790,844	28.3
Lake Ontario	256,753	5,268,439	20.5	352,678	9,760,205	27.7	294,777	7,637,001	25.9
St. Law. and Ottawa.	79,616	1,569,872	19.7	101,545	2,461,962	24.2	95,812	2,292,100	23.9
East Midland	60,772	1,208,642	19.9	92,272	2,361,746	25.6	83,204	1,982,368	23.8
Northern Districts ..	2,229	47,311	21.2	1,490	33,555	22.5	1,798	42,120	23.4
Totals	701,326	15,600,169	22.2	875,286	23,386,388	26.7	764,365	19,705,734	25.8

Only 701,326 acres have been given to barley, which is 173,960 acres less than in 1889, and a decrease of 63,039 acres compared with the average for the nine years 1882-90. The average yield per acre for the province is unusually light, being but 22.2 bushels, as against 26.7 bushels in the previous year and 25.8 bushels for the nine years period. The total yield is therefore an exceedingly small one, being 7,786,219 bushels less than in 1889, and, as was predicted in the August bulletin, fully 4,000,000 bushels below the average for the term of years. The decrease in acreage occurred in every group excepting the Lake Erie counties and the Northern Districts, but in the last named group the area is merely a nominal one. The West Midland counties average 26.8 bushels per acre (they also show the best average yield in 1889 and for the nine years), but no other group reaches the provincial average for either 1890 or the nine years. The poorest average yields are this year observed in the St. Lawrence and Ottawa and East Midland groups, neither of which reach 20 bushels to the acre.

OATS.

At the time correspondents wrote their reports for the August bulletin the oat harvest was only commencing, except in the south-western counties of the province, where operations were well under way. The opinion was generally expressed that the yield would be a light one, both in regard to pounds to the bushel and bushels to the acre. The straw was also described as rather short. As in the case of barley, the crop suffered severely from the wet and backward spring and the heat and drouth which followed. These conditions, together with a red, rusty blight which, attacked the crop very early in the summer, appear to have been the chief sources of injury. The largest amount of damage from all causes was reported from the southern lake shore counties, while in more northerly districts—particularly in the counties of Huron, Bruce, Grey and Simcoe—its condition was considered up to the average. In these counties the greater portion of the crop was still unripe at the time of reporting, but it presented a fine appearance, having largely recovered from the effects of the blight. Early varieties on well drained land have been most successful.

According to the November reports the oat crop proved a great disappointment, as the yield was not so large as was hoped for, and the berry was also quite small and light. The straw was considerably rusted, which injured it for feeding purposes. The blight left evil effects in various sections both east and west. The acreage and yield in 1889 and 1890, and the average for the nine years 1882-90, are as follows :

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie	185,806	4,429,838	23.8	184,964	5,916,841	32.0	165,776	5,877,415	35.5
Lake Huron ..	223,749	6,507,605	29.1	217,777	6,636,698	30.5	180,804	6,286,961	34.8
Georgian Bay .	177,625	5,320,863	30.0	192,786	6,293,753	32.6	153,496	4,997,150	32.6
West Midland.	406,897	12,618,834	31.0	402,619	14,992,059	37.2	340,093	12,756,012	37.5
Lake Ontario..	327,206	9,215,067	28.2	324,884	11,870,318	36.5	286,131	10,276,569	35 9
St.L. & Ottawa.	411,408	10,530,752	25.6	437,487	13,171,243	30.1	382,761	12,198,526	31.9
East Midland .	122,936	3,428,369	27.9	139,070	4,730,060	34.0	115,867	3,599,451	31.1
Nor'n. Districts.	26,739	716,879	26.8	23,857	735,329	30.8	18,562	574,192	30.9
Totals......	1,882,366	52,768,207	28.0	1,923,444	64,346,301	33.5	1,643,490	56,566,276	34.4

The oat crop falls behind its record of 1889 in both area and yield, the acreage being less by 41,078 and the total yield 11,578,094 bushels below that of the previous year. The fact that the average yield per acre was 5.5 bushels per acre more in 1889 than in 1890, however, has more to do with the shortage of the crop than the narrowing of the area has. Although the average acreage for the nine years was less than the area reported in 1890 the average total yield was greater, owing to the fact that the average yield per acre for 1882-90 was 34.4 bushels as against the lean record of 28.0 bushels in the present year. Of the eight groups, five show a slight increase in acreage, but the decrease in the Georgian Bay, St. Lawrence and Ottawa and East Midland counties is greater by the figures already quoted. The highest average yield per acre is observed in the West Midland group, but even there it reaches only 31.0 bushels, which is 3.4 bushels below the average of the province for the nine years. In the Lake Erie group the average yield per acre was only 23.8 bushels, and in the St. Lawrence and Ottawa counties, where the acreage of oats is the greatest in the province, the average yield per acre is 25.6 bushels.

THE OAT BLIGHT. Prof. Panton, of the Agricultural College, was consulted respecting the blight on oats referred to by correspondents, and in a report on the subject to the Bureau he says: " Some time ago samples of affected grain were sent to me from the eastern part of the province, and I also noticed similar conditions elsewhere. It at first appeared as if an insect was the cause of the trouble, but in the specimens examined I saw none. Some observers have noticed in samples the pupa cases of the Hessian fly, but not in such numbers as to account for so general a blight upon the grain. In the cases where rust affected the blades, it is likely that this resulted after the plant had become weakened and its vitality so impaired as to render it liable to attack by a parasitic plant like rust. It seems to me that the trouble is due more to climatic conditions, such as frost or excessive moisture, than to insects or to parasitic plants, and at present I am inclined to the view that excessive moisture was largely to blame. As far as I can learn no definite conclusion has been arrived at regarding the cause of the blight, although it has commanded a good deal of attention both in Canada and the United States."

RYE.

The condition of this crop in May was reported as generally satisfactory. It had suffered more or less from winter killing, but not to such an extent as to impair the prospect for an average crop. Its growth, however, was a little backward in the east, where it is chiefly raised. According to the August bulletin rye had given a fair yield throughout the province wherever grown, and had already been well secured in most cases. In eastern Ontario, however, it was somewhat light on the ground, owing, it was said, to winter killing. What little mention was made of rye in the November reports was favorable. The acreage devoted to the cultivation of this crop, however, is very small, and it now holds a position of little more than local importance in the province. Following is a table showing the acreage and yield for 1890 and the previous year, and also the average for the years 1882-90.

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie............	13,994	201,896	14.4	13,142	161,139	12.3	12,011	185,714	15.5
Lake Huron...........	1,732	32,648	18.8	981	17,758	18.1	979	17,297	17.7
Georgian Bay	4,069	61,822	15.2	2,903	52,181	18.0	2,947	52,602	17.8
West Midland	5,649	93,785	16.6	5,449	78,643	14.4	5,110	83,943	16.4
Lake Ontario..........	28,273	386,172	13.7	30,548	458,854	15.0	32,722	483,038	14.8
St. Law. and Ottawa...	29,576	475,333	16.1	22,072	425,818	19.3	34,224	611,487	17.9
East Midland..........	18,858	294,881	15.6	14,074	220,020	15.6	18,681	292,023	15.6
Northern Districts.....	910	16,808	18.5	937	17,266	18.4	936	18,060	19.3
Totals.........	103,061	1,563,345	15.2	90,106	1,431,679	15.9	107,610	1,744,164	16.2

The area of rye, while 12,955 acres more than in the previous year, is 4,549 acres less than the average for the nine years 1882-90. The average yield for the year is 15.2 bushels, being .7 bushels less than in 1889, and exactly a bushel below the standard for the nine years. A decrease in the acreage is noticed in the Lake Ontario group and in the Northern Districts, but every other group shows an increase. The crop however, is not likely to increase very much in importance.

PEASE.

August reports concerning pease indicated that the crop would be a fair though rather uneven one. It suffered more than any other crop from the rains of May and June, and on low clay lands it was almost a failure. The straw was afterwards scalded by the hot, dry weather which followed, and this throughout the Lake Erie counties appeared to have materially checked the growth of the vine and the filling of the pods. The crop was pronounced a very poor one in that district, but throughout the rest of the province the yield promises to be not much behind the average. In the south-west a large portion of the pea crop had been harvested as correspondents wrote, and it was said to have been secured in good condition ; elsewhere operations were just about to commence. In the older portions of the province, notably in Essex, Kent and parts of Middlesex, the bug was more injurious than usual, but in other sections the pest had not extended its operations to any marked extent. Worms were also reported as doing injury in Huron, Bruce and Grey.

In the November bulletin it was stated that pease had been attacked in nearly every district by the bug, but the least complaints regarding the pest came from the river counties. While the crop suffered much from rain on low and undrained lands, on high and sandy soils a good yield was the rule. The table following gives the acreage and yield for 1889 and 1890, together with the average for the nine years 1882-90 :

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per. acre.	Acres.	Bushels.	Bush. per. acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie	84,196	1,262,693	15.0	71,837	1,243,765	17.3	61,462	1,135,017	18.5
Lake Huron	104,950	2,223,672	21.2	88,652	1,629,066	18.4	80,766	1,763,329	21.8
Georgian Bay..........	86,074	1,868,911	21.7	86,065	1,889,918	22.0	78,021	1,668,356	21.4
West Midland	170,901	3,284,924	19.2	154,671	2,697,323	17.4	135,828	2,889,896	21.3
Lake Ontario....	181,216	3,538,243	19.5	162,758	3,029,343	18.6	151,278	2,997,392	19.8
St. Law. and Ottawa ..	85,596	1,717,316	20.1	82,426	1,677,185	20.3	92,949	1,802,716	19.4
East Midland	56,064	1,223,871	21.8	52,067	1,122,888	21.6	51,207	973,799	19.0
Northern Districts.....	12,209	269,683	22.1	9,592	219,749	22.9	8,174	187,619	23.0
Totals.........	781,206	15,389,313	19.7	708,068	13,509,237	19.1	659,685	13,418,124	20.3

This crop continues to grow in favor, an increase in the acreage being observed in every county group compared with the previous year, amounting in all to 73,138 acres. The yield per acre for the province, while .6 bushels higher than that of 1889, is .6 bushels lower than the average for the nine years 1882-90. The total yield is 1,880,076 bushels more than that of the previous year. The average yield per acre for the nine years is exceeded in the Lake Huron, Georgian Bay and East Midland groups and in the Northern Districts, but in the Lake Erie counties the remarkably small yield of 15.0 bushels per acre is returned. The largest acreage is found in the Lake Ontario group, and the crop is also very popular in the West Midland and Lake Huron counties.

INDIAN CORN.

When the August returns were sent in by correspondents there were indications of a favorable crop in Essex and Kent, the corn region of the province, and in parts of Elgin, Lambton and Middlesex. In the counties fronting on the lakes, between Elgin and Halton, the prospects were not so good, but elsewhere, and especially in the eastern part of the province, it was believed there would be an abundant supply of fodder corn. The crop was rather backward, however, owing to the wet seeding time and the cool spell which followed it. These conditions combined did a large amount of injury in the western corn district, where in a number of instances seed had to be planted a second time. The general drouth which set in later was also adverse to the growth, but the showery weather in the early part of August improved the condition of the crop, so that it was said to have recovered itself in large measure.

The November bulletin characterised the quality of corn as below the average. Owing to rainy weather it was rather soft and there was a tendency to mould in the crib. The acreage and yield for 1890 and the previous year are given in the following table by county groups and for the province, together with the average for the eight years 1882-90 :

Districts.	1890.			1889.			Yearly average for the eight years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie	99,914	6,696,013	67.0	85,284	3,899,376	45.7	93,848	6,516,708	69.4
Lake Huron.........	13,590	793,611	58.4	9,877	402,988	40.8	9,831	597,472	60.8
Georgian Bay	3,346	182,062	54.4	2,003	96,414	48.1	1,539	81,650	53.1
West Midland.......	33,590	2,092,447	62.3	27,657	1,338,581	48.4	27,436	1,775,427	64.7
Lake Ontario........	34,692	1,948,478	56.2	31,842	1,733,524	54.4	28,779	1,689,691	58.7
St. Law. and Ottawa.	28,764	1,792,316	62.3	21,679	1,326,955	61.2	19,195	1,094,587	57.0
East Midland	9,549	491,469	51.5	8,404	433,625	51.6	6,979	356,862	51.1
Northern Districts...	391	14,785	37.8	370	16,736	45.2	325	13,124	40.4
Totals............	223,836	14,011,181	62.6	187,116	9,248,199	49.4	187,932	12,125,521	64.5

Corn in the ear is raised chiefly in the Lake Erie counties, where 99,914 acres, or about 45 per cent. of the entire corn area of the province, are given to the crop. The total acreage of corn is 36,720 more than in 1889, and every group has helped to swell the increase. The average yield per acre of the province while very far ahead of that of the previous year of failure, falls 1.9 bushels below the average for the eight years. The average yield of 67.0 bushels per acre in the Lake Erie group is 2.5 bushels more than the provincial average for 1882-90, but falls short by 2.4 bushels of its own record for the eight years. The total yield of the province, 14,011,181 bushels, looks large compared with that of the poor corn year of 1889, or even with the average for the eight years, but it is 3,425,599 bushels less than the magnificent yield of 1888.

BUCKWHEAT.

Correspondents had very little to say about buckwheat. This crop commands but a very limited area, being confined chiefly to a few counties in the Lake Erie, Lake Ontario and St. Lawrence and Ottawa groups, and the county of Hastings. The yield per acre was reported above the average, and the quality was described as good. The frost touched the crop slightly. The acreage and yield for 1889 and 1890, and also the average for 1882-90, is given in the following table:

Districts.	1890.			1889.			Yearly average for the eight years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie...........	12,029	253,371	21.1	8,773	164,100	18.7	10,006	202,051	20.2
Lake Huron.........	2,419	38,257	15.8	720	13,008	18.1	1,130	21,056	18.6
Georgian Bay	1,522	28,094	18.5	464	7,581	16.3	746	12,962	17.4
West Midland.......	2,990	59,942	20.0	1,743	32,473	18.6	2,322	45,490	19.6
Lake Ontario........	27,280	605,902	22.2	17,614	344,931	19.6	17,044	373,858	21.9
St. Law. and Ottawa.	33,488	825,706	24.7	22,149	596,859	26.9	27,330	649,612	23.8
East Midland	9,402	219,012	23.3	4,569	104,831	22.9	5,499	123,708	22.5
Northern Districts...	981	23,436	23.9	366	8,795	24.0	500	12,621	25.2
Totals............	90,111	2,053,720	22.8	56,398	1,272,578	22.6	64,577	1,441,358	22.3

The total area of 90,111 acres is 33,713 acres greater than that of the previous year, and 25,534 acres more than the average for the eight years. Every county group shows an increase in the acreage. This, together with the fact that the average yield per acre is .2 bushel more than in 1889, and .5 bushel more than the average for 1882-90, explains the largely augmented total yield.

BEANS.

Heavy rains delayed planting, and the crop was consequently in a rather backward condition when correspondents wrote in August. On well selected soils where care had been bestowed on their culture, beans were reported as giving excellent promise, notwithstanding the drouth of July, but lack of moisture told heavily against the crop on clay soils. In the few localities in eastern Ontario where beans are specially grown a splendid crop was anticipated. The autumn report concerning the crop was to the effect that it was hardly a fair yield, and that on account of wet weather it was late in ripening and difficult to gather. Very late beans were slightly affected by frost. The acreage and yield for 1889 and 1890, together with the average for the eight years 1882-90, are as follows:

Districts.	1890.			1889.			Yearly average for the eight years, 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie...........	30,323	585,846	19.3	15,069	232,362	15.4	16,522	319,709	19.4
Lake Huron.........	729	11,278	15.5	473	8,662	18.3	577	11,783	20.4
Georgian Bay	429	8,424	19.6	215	4,300	20.0	240	4,426	18.4
West Midland......	917	17,033	18.6	695	13,297	19.1	1,071	22,083	20.6
Lake Ontario........	2,530	44,739	17.7	1,741	32,632	18.7	2,084	44,071	21.1
St. Law. and Ottawa.	3,660	75,209	20.5	2,999	70,656	23.6	3,207	76,181	23.8
East Midland	757	16,491	21.8	533	7,914	14.8	556	10,748	19.3
Northern Districts...	111	2,321	20.9	105	2,070	19.7	74	1,540	20.8
Totals............	39,456	761,341	19.3	21,830	371,893	17.0	24,331	490,541	20.2

Fully three-fourths of the bean area is to be found in the Lake Erie group, where 30,323 acres (over double its own acreage of last year) are returned for the crop, the county of Kent alone now devoting nearly 25,000 acres to beans. The average yield per acre of this great bean growing group of counties is exactly the same as that for the remainder of the province, which is 19.3 bushels, being 2.3 bushels more than in the previous year, but .9 bushel below the average for the eight years. The total area of beans is 17,626 acres greater than that of 1889, and 15,254 acres of this increase is noted in the Lake Erie group. The total yield for the province is over double that of the preceding year.

FIELD ROOTS.

Thunder storms in midsummer, quickly followed by unusually hot weather, got the soil into a rather baked condition, and threatened the success of turnips, mangels and carrots. Frequent rains in the early part of the growing season also fostered weeds to an unusual extent, which rendered the cultivation of roots exceedingly difficult. In the autumn bulletin correspondents (under date of November 10) wrote that the recent fine weather had generally been taken advantage of by farmers to raise and house roots of all kinds, and that it was likely that these crops would be saved in good condition.

POTATOES. The August bulletin stated that low lands, owing to the copious rains of spring, proved bad for potatoes, much of the seed having rotted. On high and well-drained soils a more cheering condition was reported. Premature ripening of the vines was complained of in various sections, but more especially in the eastern part of the province. Several correspondents writing in August expressed a fear that the tubers would be under-sized, and according to the November bulletin their fears were realised, for potatoes were therein described as "light in yield and small in sample." The crop did best on the lighter soils, but was almost a failure on clay lands. In the south-western counties it was reported as below the average in yield and small in size, but of fair quality, and little rot was complained of. The best reports regarding quality and general condition came from the Georgian Bay and West Midland counties, but even in these groups the the rot was prevalent. In fact, rot was complained of from all quarters, and as it is not always prevented by housing it was feared that the net yield might be still further diminished by the spring. The following table gives the acreage and yield for 1889 and 1890, and also the average for 1882-90:

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie...........	14.640	1,156,746	79.0	13,295	836,971	63.0	16,098	1,700,152	105.6
Lake Huron.........	12,706	1,321,519	104.0	11,422	1,048,661	91.8	12,782	1,451,802	113.6
Georgian Bay........	14,211	2,071,965	145.8	12,974	1,397,613	107.7	13,687	1,747,484	127.7
West Midland.......	27,821	3,255,232	117.0	23,228	1,958,035	84.3	26,746	3,119,141	116.6
Lake Ontario.... ...	33,670	3,251,595	96.6	30,545	2,928,942	95.9	31,656	3,486,483	110.1
St. Law. and Ottawa.	38,335	4,477,866	116.8	37,938	3.870,337	102.0	38,737	4,811,710	124.2
East Midland........	12,711	1,442,281	113.5	13,225	1,781,113	134.7	12,310	1,511,123	122.8
Northern Districts...	4,000	583,913	146.0	3,185	533,857	167.6	2,903	433,321	149.3
Totals............	158,094	17,561,117	111.1	145,812	14,355,529	98.5	154,919	18,261,216	117.9

The area of potatoes is 12,282 acres greater than that of 1889, and the average yield per acre is 12.6 bushels more, which means an increase in the total yield of 3,205,588 bushels. The total yield of 1890, however, falls 700,099 bushels short of the average for 1882-90, in spite of the increased acreage, owing to the fact that the average yield of 111.1 bushels per acre is 6.8 bushels below the average for the nine years. Compared with 1889, the East Midland is the only group revealing a decrease in the acreage. The average yield of 146.0 bushels per acre in the Northern Districts is a tribute to the richness of the virgin soil in the new settlements, yet the return falls short by 3.3 bushels of the average yield per acre of that group for the years 1882-90. The Lake Ontario and St. Lawrence and Ottawa counties, as usual, have the largest acreages of potatoes, but the first-named group has an average yield per acre of only 96.6 bushels, which is not as bad, however, as that of the Lake Erie counties, where only 79.0 bushels per acre are returned. The yield in the Lake Huron counties is also below the average of the province for the year.

MANGEL-WURZELS. Although mangels suffered considerably by the hot weather immediately following heavy rains, the crop on the whole turned out to be a splendid one, being of good quality and much above the average yield. As the acreage had been considerably increased and the crop was well housed, the season of 1890 may be regarded as a most successful one for mangel-wurzels. The following is a comparative table of acreage and yield for 1889, 1890, and 1882-90 :

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie........	1,607	701,312	436	1,666	491,490	295	1,323	514,130	389
Lake Huron..........	3,370	1,562,735	464	2,638	945,326	358	2,394	1,036,984	433
Georgian Bay........	1,229	497,619	405	770	321,398	417	1,007	419,287	416
West Midland......	8,946	4,203,084	470	7,223	2,200,121	305	6,229	2,792,532	448
Lake Ontario.	6,027	2,756,943	457	5,594	2,036,926	364	5,181	2,270,311	438
St. Law. and Ottawa.	2,447	922,461	377	1,735	619,419	357	1,715	633,037	369
East Midland........	2,276	933,584	410	1,513	590,423	390	1,237	490,516	397
Northern Districts...	51	16,780	329	72	18,375	255	81	21,148	261
Totals............	25,953	11,594,518	447	21,211	7,223,478	341	19,167	8,177,945	427

The crop continues to grow in the good opinion of agriculturists, except in the Lake Erie counties and the Northern districts, where mangels are never extensively raised. Not only is there an increase in acreage, but the average yield per acre for the province is far ahead of that of the previous year and also of that of the term 1882-90. The average yield of the province for the nine years is this year exceeded in the Lake Erie, Lake Huron, West Midland and Lake Ontario groups.

CARROTS. The yield of carrots was better than ordinary, and the remarks concerning mangel-wurzels might be repeated as applying to this crop also. Carrots are evidently coming into favor again. The following table gives the acreage and yield by county groups :

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie........	982	299,056	305	882	204,078	231	717	200,722	280
Lake Huron.........	1,048	371,141	354	1,047	286,000	273	1,003	351,411	350
Georgian Bay........	1,145	417,300	364	1,015	347,028	342	1,129	410,633	364
West Midland.......	2,563	959,592	374	2,355	664,267	282	2,272	832,850	367
Lake Ontario........	2,918	1,097,486	376	3,157	1,055,037	334	2,860	1,067,375	373
St. Law. and Ottawa.	2,141	678,081	317	1,723	496,109	288	1,546	473,030	306
East Midland........	989	346,111	350	935	331,296	354	822	271,424	330
Northern Districts...	191	41,775	219	147	48,144	328	137	34,716	253
Totals...........	11,977	4,210,542	352	11,261	3,431,959	305	10,486	3,642,161	347

An extension of 716 acres in the area and an increase of 47 bushels in the average yield per acre have resulted in making the total yield of carrots 778,583 bushels more than that of the previous year, while it is 568,381 bushels more than the average for the nine years. The Lake Ontario group is the only district which does not show an increase in the area of the crop compared with the previous year. The poorest yields are observed in the Northern Districts and the Lake Erie counties, and the St. Lawrence and Ottawa and East Midland groups also fall below the average of the province for the year, but the royal yields of the four other groups, more especially those of the Lake Ontario and West Midland counties, raise the average for the year 5 bushels above the standard of the nine years 1882-90.

TURNIPS. Turnips suffered from the causes already described as affecting the other field roots, and in addition were attacked by the fly. But in spite of the fears expressed by correspondents in August, the crop gave relatively the best yield of any in its class. The November bulletin described turnips as small in some localities, although late rains had improved the crop generally. Favorable weather for pitting was anticipated. The acreage and yield for 1889 and 1890, together with the averages for 1882 90, are given in the following table :

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Lake Erie....	2,579	859,137	333	2,896	779,100	269	2,181	749,789	344
Lake Huron.........	12,636	5,531,452	438	12,948	3,978,598	307	12,551	4,825,564	384
Georgian Bay........	13,345	5,678,382	426	13.038	4,536,222	348	12,322	4,887,500	397
West Midland...... ..	36,316	14,975,082	412	35,065	10,440,234	298	34,696	13,905,782	401
Lake Ontario........	32,509	15,085,001	464	33,037	12,202,146	369	29,129	11,796,512	405
St. Law. and Ottawa.	5,360	1,967,738	367	4,479	1,601,906	358	4,002	1,337,625	334
East Midland........	6,145	2,194,655	357	7,339	2,662,901	363	5,638	1,948,568	346
Northern Districts...	2,165	749,116	346	2,301	820,153	356	2,076	655,255	316
Totals............	111,055	47,040,563	424	111,103	37,021,260	333	102,595	40,106,595	391

This is the only root crop which has shrunk in area, the number of acres being 48 less than in 1889, although the Georgian Bay, West Midland and St. Lawrence and Ottawa groups each show an increase as compared with their respective acreages in the previous year. The average yield per acre for the province, however, is 91 bushels more than that of 1889, and 33 more than that of 1882-90, and the consequence is an increase in the total yield of 10,019,303 bushels compared with the crop of 1889, and 6,933,968 bushels compared with the average for the nine years. The splendid average yield of 464 bushels per acre is recorded for the Lake Ontario counties, and three other groups also go over the average for the nine years. The average yield of the Lake Erie counties, the lowest for the year, is identical with the average of the province in 1889, which was a very poor year for turnips, and this group is the only one which does not surpass its own average for the nine years.

HAY AND CLOVER.

The condition of clover in the spring was not very satisfactory, being very similar to that of fall wheat. The seed appears to have made a very good catch, but the light snowfall during the winter afforded but little protection to the roots, and much damage was also caused by alternate freezing and thawing, especially on low meadows and where the land was low and poorly drained. Some correspondents in May said that it looked as if the roots might yet be raked into heaps and the land replowed for other crops. But on high and sandy soils the new clover presented a more encouraging appearance, and promised a good crop should conditions continue favorable. The most serious damage from all causes occurred in the south-western counties, more especially in Essex and Kent. In the central, northern and eastern portions of the province the reports were more cheerful in tone. With the exception of the counties of Dundas and Stormont and a few other localities along the St. Lawrence, every county reporting in August gave unanimous expression to the opinion that the hay crop was a magnificent one. Manycorrespondents reported that so big a crop had never been known in their respective neighborhoods. In the western and central counties hay was saved in splendid condition, but "catchy" weather was reported in various sections further east. Taken altogether, however, the crop was not only a large one, but its general quality was first-class. In different parts of the province there was no room in the barns for the cut, and an unusual number of hay stacks were to be seen. Cutting was rather later than usual. The midge was reported in several counties, and was spoken of as likely to thin the yield of clover seed. The acreage and yield in 1889 and 1890, together with the average for 1882-90, are given in the following table:

Districts.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.
Lake Erie.	286,576	525,644	1.83	296,596	508,450	1.71	274,032	403,023	1.47
Lake Huron..........	270,648	484,865	1.79	257,147	399,795	1.55	233,194	330,261	1.42
Georgian Bay........	209,795	375,602	1.79	211,275	309,338	1.46	191,497	251,471	1.31
West Midland.	433,638	897,491	2.07	419,362	681,957	1.63	408,271	632,981	1.55
Lake Ontario........	417,641	760,974	1.82	404,637	649,232	1.60	406,197	576,737	1.42
St. Law. and Ottawa.	618,434	895,976	1.45	595,669	918,604	1.54	554,200	747,169	1.35
East Midland........	168,581	267,568	1.59	157,131	206,714	1.32	153,088	188,288	1.23
Northern Districts...	56,689	97,795	1 73	44,406	54,223	1.22	41,185	51,684	1.25
Totals............	2,462,002	4,305,915	1.75	2,386,223	3,728.313	1.56	2,261,664	3,181,614	1.40

The total yield of 4,305,915 tons, which is 577,602 tons more than that of the previous year, and 1,124,301 tons more than the average for the nine years 1882-90, is due to the increase both in area and yield. The acreage of 1889 is enlarged by 75,779, and the average yield per acre of that year is exceeded by .19 ton. A decrease in acreage compared with the previous year is observed in the Lake Erie and Georgian Bay counties, but the splendid yields in each of these groups lift their total returns considerably above their respective records in 1889. None of the county groups fall as low as the average of the province for the nine years, and but one, the St. Lawrence and Ottawa, goes below the average of the province for 1889. The West Midland counties show the magnificent average yield per acre of 2.07 tons.

CLOVER SEED. The raising of clover for seed has been but little practised in this province of late years, owing to repeated failures of the crop. This year will not likely give great encouragement to farmers, for while a few fields were reported as good, the majority of correspondents represented the crop as not worth the threshing. The most favorable reports came from Prince Edward and some of the river counties. The midge, as usual, pursued its destructive work in nearly every district, but much injury was also done by drouth immediately after harvest. Frost did not seriously affect the crop.

COMPARATIVE YIELDS OF FIELD CROPS.

AGGREGATE YIELD OF FIELD CROPS. The aggregate yield of a crop must of course depend upon two things, viz., the acreage and average yield, and each of these factors is dealt with elsewhere. In the following table the net results of acreage and yield are shown by county groups and for the province for a series of years. The column for 1885-90 is inserted to correspond with the table of values, some of the items in which were computed only from 1885 :

Field Crops.	1890.	1889.	1888.	1887.	1886.	1885-90.	1882-90.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
Fall wheat	14,267,383	13,001,865	13,830,787	14,440,611	18,071,142	15,848,345	17,635,540
Spring wheat....	7,683,905	5,697,707	6,453,559	5,633,117	9,518,553	7,352,787	8,679,827
Barley..........	15,600,169	23,386,388	23,366,569	17,134,830	19,512,278	19,255,637	19,705,734
Oats............	52,768,207	64,346,301	65,466,911	49,848,101	58,665,608	57,720,812	56,566,276
Rye............	1,563,345	1,431,679	1,295,302	894,887	1,106,462	1,260,530	1,744,164
Pease	15,389,313	13,509,237	14,269,863	12,173,332	16,043,734	14,231,945	13,418,124
Corn	14,011,181	9,248,199	17,436,780	8,404,752	10,805,309	11,774,602	12,125,521
Buckwheat	2,053,720	1,272,578	1,222,283	1,025,353	1,678,708	1,463,886	1,441,358
Beans	761,341	371,893	534,526	275,975	482,072	487,062	490,541
Potatoes........	17,561,117	14,355,529	22,273,607	10,678,000	16,012,358	16,995,293	18,261,216
Mangel-wurzels..	11,594,518	7,223,478	10,020,659	5,695,761	8,787,743	8,497,148	8,177,945
Carrots..........	4,210,543	3,431,959	3,898,584	2,105,686	3,478,751	3,431,307	3,642,161
Turnips	47,040,563	37,021,260	47,640,237	31,413,456	47,061,053	41,885,717	40,106,595
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Hay and clover..	4,304,915	3,728,313	2,009,017	3,093,610	2,994,446	3,230,409	3,181,614

Fall wheat, spring wheat, rye and potatoes have each a considerably larger yield than in the previous year, but both fall greatly behind their averages for the nine years 1882-90. Barley and oats are less than in 1889, as well as below their averages for the nine years. All the other crops exceed their aggregates both for the previous year and for the nine years period. The increases in the total yields of buckwheat, mangel-wurzels and hay and clover are relatively the largest compared with their averages for the nine years. Barley, fall and spring wheats have had the greatest proportional decline compared with 1882-90.

RATIOS OF AGGREGATE YIELD. The table following presents the per cent. ratios of aggregate production of the several crops in 1890 by county groups and for the province as compared with the nine years 1882-90:

Districts.	Fall Wheat.	Spring Wheat.	Barley.	Oats.	Rye.	Pease.	Corn.	Buck-wheat.	Beans.	Hay and Clover.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.
Lake Erie........ ..	89	171	101	75	109	111	103	125	183	130	68	136	149	115
Lake Huron.............	80	94	98	104	189	126	133	182	96	147	91	151	106	115
Georgian Bay............	74	86	82	106	118	112	223	217	190	149	119	119	102	116
West Midland...........	85	102	100	99	112	114	118	132	77	142	104	151	115	108
Lake Ontario............	72	88	69	90	80	118	115	162	102	132	93	121	103	128
St. Lawrence and Ottawa	54	75	68	86	78	95	164	127	99	120	93	146	143	147
East Midland...........	76	88	61	95	101	126	138	177	153	142	95	190	128	113
Northern Districts......	154	69	112	125	93	144	113	186	151	189	135	79	120	114
The Province.........	81	89	79	93	90	115	116	142	155	135	96	142	116	117

Out of the fourteen items comprising the table, eight go over the 100 in the figures for the province, viz., beans, buckwheat, mangel-wurzels, hay and clover, turnips, carrots, corn and pease. The standard is exceeded in every district in the case of corn, buckwheat, hay and clover, carrots and turnips. The Northern Districts have the highest per cent. ratio in fall wheat, barley, oats, pease, hay and clover and potatoes, the Georgian Bay group in corn (with the surprising record of 223), buckwheat and beans, the Lake Erie counties in spring wheat and carrots, the Lake Huron group in rye, the St. Lawrence and Ottawa in turnips, and the East Midland in mangel-wurzels. Fall wheat shows a ratio of only 81 per cent. for the province, but the figures for that crop in the St. Lawrence group dip to 54 compared with their average for the nine years.

RATIOS OF YIELD PER ACRE. The per cent. ratios of the average yield per acre of the leading field crops compared with the average yield of the nine years 1882-90, are given by county groups and for the province in the following table, each group being compared with its own average:

Districts.	Fall Wheat.	Spring Wheat.	Barley.	Oats.	Rye.	Pease.	Corn.	Buck-wheat.	Beans.	Hay and Clover.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.
Lake Erie...............	102	90	83	67	93	81	97	104	99	124	75	112	109	97
Lake Huron.	108	112	91	84	106	97	96	85	76	126	92	107	101	114
Georgian Bay............	90	91	96	92	85	101	102	106	107	137	114	97	100	107
West Midland...........	112	112	95	83	101	90	96	102	90	134	100	105	102	103
Lake Ontario...........	94	75	79	79	93	98	96	101	84	128	88	104	101	115
St. Lawrence and Ottawa	90	70	82	80	90	104	109	104	86	107	94	102	104	110
East Midland............	89	85	84	90	100	115	101	104	113	129	92	103	106	103
Northern Districts.......	94	82	91	87	96	96	94	95	100	138	98	126	87	109
The Province.........	102	84	86	81	94	97	97	102	96	125	94	105	101	108

Hay and clover makes an excellent showing for the province, the figures reaching 125. The ratios of turnips, mangel-wurzels, fall wheat, buckwheat and carrots also exceed 100 in the order named. Fall wheat has its highest showing in the West Midland group and its lowest in the East Midland. The ratio of spring wheat reaches 112 in the Lake Huron and West Midland groups, but drops to 70 in the St. Lawrence and Ottawa counties. Barley and oats fail to reach 100 in any district. Rye, pease, corn and beans each have three figures in three groups, while buckwheat fails to reach the standard in two districts only. Hay and clover does not go below 107 in any group, and mounts as high as 137 and 138. Potatoes reach 114 in the Georgian Bay counties and match the standard in the West Midland group, but show only a pair of figures in the other districts. The Georgian Bay group with 97, is the only district falling below 100 for mangel-wurzels, but carrots and turnips show three figures in every group.

AVERAGE YIELDS PER ACRE. The yields per acre are shown in the following table by county groups and for the province for the years 1889 and 1890, with the averages for the six and nine years 1885-90 and 1882-90:

Field crops.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.			
									1890.	1889.	1885-90.	1882-90.
	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.	Bush.
Fall Wheat....	18.8	20.9	18.1	22.0	18.8	16.1	17.4	17.9	19.8	15.8	18.9	19.4
Spring Wheat.	13.2	15.5	13.2	16.6	11.9	11.2	12.2	14.6	12.8	14.3	13.7	15.2
Barley	20.5	24.3	24.1	26.8	20.5	19.7	19.9	21.2	22.2	26.7	25.3	25.8
Oats...........	23.8	29.1	30.0	31.0	28.2	25.6	27.9	26.8	28.0	33.5	33.0	34.4
Rye...........	14.4	18.8	15.2	16.6	13.7	16.1	15.6	18.5	15.2	15.9	15.4	16.2
Pease..........	15.0	21.2	21.7	19.2	19.5	20.1	21.8	22.1	19.7	19.1	20.0	20.3
Corn	67.0	58.4	54.4	62.3	56.2	62.3	51.5	37.8	62.6	49.4	63.0	64.5
Buckwheat....	21.1	15.8	18.5	20.0	22.2	24.7	23.3	23.9	22.8	22.6	21.9	22.3
Beans	19.3	15.5	19.6	18.6	17.7	20.5	21.8	20.9	19.3	17.0	19.5	20.2
Potatoes.......	79.0	104.0	145.8	117.0	96.6	116.8	113.5	146.0	111.1	98.5	113.6	117.9
Mangel-wurzels	436	464	405	470	457	377	410	329	447	341	421	427
Carrots........	305	354	364	374	376	317	350	219	352	305	331	347
Turnips	333	438	426	412	464	367	357	346	424	333	392	391
	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.	Ton.
Hay and Clover	1.83	1.79	1.79	2.07	1.82	1.45	1.59	1.73	1.75	1.56	1.39	1.40

Spring wheat, barley, oats and rye are the only crops which do not show an increase compared with their respective yields per acre in the previous year, while fall wheat, buckwheat, hay and clover, mangels, carrots and turnips are the only crops exceeding their own average yields for the nine years. The highest yield per acre is found in the following districts: Lake Erie, corn; Lake Huron, rye and mangel-wurzels; West Midland, fall wheat, spring wheat, barley, oats, and hay and clover; Lake Ontario, carrots; St. Lawrence and Ottawa, buckwheat and turnips; East Midland, beans; Northern Districts, pease and potatoes.

FRUIT AND FRUIT TREES.

The majority of correspondents, more especially those in the eastern part of the province, reported vegetation rather backward as April closed. The reports concerning orchards were on the whole favorable. On the 1st of May the peach was in blossom along Lake Erie and the Niagara river, and the damage to this tender tree during the winter was said to have been very slight. While not so far advanced in bud, apples promised well, more especially in the Lake Huron and West Midland counties, where it was "an off year" in 1889. Plums and cherries suffered from black-knot, the latter to such a degree that the extinction of the fruit in Ontario at an early day is threatened unless decisive measures are taken to deal with the disease. A heavy wind storm uprooted orchard trees in various counties, but the damage was not at all general. Grapes and small fruits generally were considered as promising, although in two or three western counties strawberries were injured by lying too long under water. It was also remarked that mice or other field vermin had done no perceptible injury.

The August bulletin had the following paragraph: "The splendid promise at the period of blossoming has not been fulfilled. Much of the fruit did not set, and apples, pears, plums and other fruits have been falling in an immature condition to an alarming extent. Apples will be less than one-third of a crop, and the quality so far as appearance is concerned will not be of the best. It is also a poor year for pears. Plums are a comparative failure, except in Grey and one or two other localities; the black-knot and the curculio are doing deadly work. Cherries are reported as giving a big yield in several sections, but the black-knot has also claimed this fruit for its own, and in many places the trees are rapidly disappearing from the orchards. There will be a few early peaches for the market, but the later and better varieties will be very scarce. Strawberries were not so abundant as was expected, but small fruits generally were about an average. Grapes give promise of a glorious yield in the Lake Erie region, where this fruit is now being largely grown."

The following summary of the condition of the orchard during the season, appeared in the November bulletin: "In scarcely any section of the province can it be said that the apple crop has been an abundant one. The trees blossomed with great promise in the spring, but a blight, apparently caused by the cold, wet weather, sadly diminished the chances for a heavy crop of fruit. In the extreme south-west the leaves of apple and pear trees assumed a rusty reddish color, and the newly formed fruit dropped in considerable quantities; and in many other localities the fruit dropped while yet immature. In the counties of Essex, Kent, Elgin, Lambton and Middlesex, the apple crop was nearly an entire failure, and of other fruits there has been not more than a sufficiency to supply local demands. In most of the West Midland counties there has been a small surplus of winter apples, and there as well as in the Niagara peninsular pears, plums, cherries and grapes and other small fruits have been moderately plentiful, but grapes are the only fruit of which any considerable shipments have been made. All variety of peaches were scarce, although occasionally an extra sample has been produced. Apples were a good crop in the counties of Grey, Bruce and Huron, and also moderately good in Simcoe. From the first three of these counties large quantities have been shipped at good prices. From the township of St. Vincent (Grey) it is stated that fifteen thousand barrels have been shipped. Pears were moderately plentiful also, and have generally turned out better than apples. Throughout the eastern counties there has been a small surplus of apples, and other fruits have been about adequate to the demand. Winter apples vary greatly in size, shape and quality. The fall varieties are generally uneven in shape and of scabby appearance, but the supply has been moderate. The general appearance of fruit trees is satisfactory, very fair growth having been made. Black-knot on plum and cherry trees appears to be gradually increasing, and in some districts trees have been almost exterminated by it. Every possible precaution ought to be taken to prevent its encroachment on districts at present unaffected."

AREA IN ORCHARD AND GARDEN. The following table shows the area in orchard and garden by county groups and for the province for each of the years 1882-90, together with the average for the nine years, and the rate per 1,000 acres cleared in 1890 :

Year.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
1890..........	39,517	21,600	11,858	37,338	52,438	11,098	8,330	617	182,796
1889..........	39,699	21,105	11,729	37,256	52,242	12,079	8,130	526	182,766
1888..........	38,015	20,342	11,620	36,524	53,881	11,733	7,839	603	180,557
1887..........	37,067	19,874	11,129	37,402	54,080	12,401	8,911	578	181,442
1886..........	39,028	19,946	11,097	38,304	56,622	12,375	8,635	609	186,616
1885..........	39,844	19,925	11,555	40,593	56,796	13,145	8,838	570	191,266
1884..........	39,952	19,952	11,577	41,628	55,112	14,320	9,780	516	192,837
1883..........	40,084	19,907	12,228	42,800	57,358	14,760	9,950	363	197,450
1882..........	42,700	21,478	14,347	44,987	58,559	19,028	12,285	462	213,846
1882-90........	39,545	20,459	11,904	39,648	55,232	13,438	9,189	538	189,953
Rate per 1,000 acres cleared, 1890........	28.3	16.3	11.4	16.3	22.8	4.8	9.9	4.0	15.7

The total area of farm property in orchard and garden is 182,796 acres, being 30 acres more than was reported in 1889. The ratio per 1,000 acres cleared is 15.7 for the province, ranging from 9.9 in the Northern Districts, and 11.4 in the Georgian Bay group to 28.3 in the Lake Erie counties.

FALL PLOWING.

When correspondents wrote (on or before the 10th of November) fall plowing was hardly so well advanced as might be desired. The complaint was very general that the land was too wet, and with many farmers the somewhat late harvest rushed fall work considerably. In Essex, Kent and Elgin but little plowing had been attempted, owing principally to corn husking, and in Lambton the excessive wet weather hindered operations. In the West Midland and Georgian Bay counties the work was fairly well advanced, notably in Simcoe and Middlesex, where it was reported that many farmers were about through. In the eastern counties the land for the most part was in good condition and the weather fine and open, so that notwithstanding the lateness of the harvest the farmers were enabled to plow fully as large an area as usual, and the work was everywhere nearly completed.

UNDERDRAINAGE.

In the Georgian Bay counties very little was done this year in the way of underdrainage, but in the other western groups of counties average progress was made, and more than the average in the county of Perth, where one correspondent described the activity in drainage as "a craze." With the exception of the county of York, little progress was made in the eastern groups apart from an odd farm here and there. In the

Lake Huron counties lumber is still largely used in the construction of drains on account of its cheapness, but in the Lake Erie and in some of the West Midland counties tile is preferred, and there was an abundant supply. Only two or three correspondents stated that the tile draining machines are in use, but more frequent mention was made of their abandonment.

THRESHING AND MARKETING.

The November bulletin had the following remarks under the above heading : "With the exception of some of the counties along the St. Lawrence, threshing appears to be well advanced ; many correspondents report the work as completed. As might be expected, most of the barley of good color was hurriedly marketed in order to head off the operations of the McKinley Bill. Pease have been more freely sold than wheat or oats, and there appears to be a disposition among those who can afford it to hold back the last named grains for a rise, although frequent mention is made of the fact that early marketing of wheat was made owing to hard times. Several correspondents state that the reason more grain has not been marketed is that there is very little above home requirements to dispose of." Many references were made by correspondents to the direct effects of the McKinley tariff upon the barley trade of this province, from which the following qnotations are taken :

Harwich, Kent : The barley is all marketed. The principal part of it went to the United States.

Walpole, Haldimand : Barley is nearly all marketed. It was rushed out to get ahead of the McKinley Bill.

Stephen, Huron : The prospect of the McKinley Bill induced many farmers to sell their surplus barley before the 6th of October.

Gwillimbury W., Simcoe : Marketing has been slow in progress except in the case of barley which was hurried to market before the McKinley tariff came into operation.

McGillivray, Middlesex : Most of the barley has been marketed. It was hurried out before the McKinley Bill came into force.

Zorra E., Oxford : Threshing is nearly all through. Wheat has been withheld while barley has been shipped so as to be ahead of the "new duty."

Minto, Wellington : Barley was generally hurried to market in view of the McKinley Bill going into operation.

Waterloo, Waterloo : This year's crop is principally all threshed, and the McKinley Bill has rushed the barley to market.

Beverly, Wentworth : A great deal of threshing has been done, but not much was marketed except barley, which was rushed to market before the McKinley Bill came into operation.

Esquesing, Halton : Not much wheat has been marketed as yet, but the McKinley Bill sent most of the barley to market in a hurry.

Markham, York : Nearly all the six-rowed barley was marketed before the McKinley Bill came into effect.

Reach, Ontario : Barley was rushed out fast before the U. S. tariff went into effect, but it has nearly stood still since.

Haldimand, Northumberland : Barley was crowded into market before the McKinley Bill took effect.

Ameliasburg, Prince Edward : The McKinley tariff in the United States created quite an early rush in the marketing of barley.

Adolphustown, Lennox and Addington : About one-half of the barley crop was sold before the McKinley tariff came into operation.

Richmond, Lennox and Addington : Barley was rushed into market before the 6th ult. to head off the McKinley tariff.

GENERAL REMARKS.

The following are selected from the general remarks of correspondents :

FROM THE MAY REPORT.

Colchester N., Essex : In winter when there is snow we can find profitable employment in getting out logs for lumber and staves, and during the summer in assisting to manufacture the same ; but this season we have not had a day of sleighing or a day that the bush was frozen hard enough for this class of work to be done with any advantage.

Camden, Kent : A great many in this locality are turning their attention to fruit raising, numbers of new orchards having been recently started.

Yarmouth, Elgin : A large quantity of maple syrup and sugar was made this spring.

Usborne, Huron : I think farmers make a mistake in allowing stock to run over and eat off the young clover in the fall, as the fall growth would protect the root during the winter. I know of some fields on which the stock were not allowed to run that are not much injured by the winter,

Dorchester N., Middlesex : In this locality sending milk to the cheese factory is the principal occupation of farmers, cheese and hogs being our staple farm products. This business is improving slowly in the way of farmers raising their own cows instead of going into non-dairying districts and buying what often turn out to be "scrubs."

Fullarton, Perth : Farmers should be more careful in selecting clean seed grain and grass seed in order to prevent the introduction of noxious weeds. It would also be well if they would be careful when they notice fresh kinds of weeds to check them in time before they get spread about to such an extent that it is almost impossible to subdue them.

Richmond, Lennox and Addington : The building of the double line on the G. T. R. and the laying of water pipes in Napanee tended to increase wages considerably in this locality. The completion of the latter work, however, has thrown a number of men out of employment and wages have again fallen.

Oso, Frontenac : This county is more for mining than farming. There are some well paying phosphate mines here.

Elizabethtown, Leeds and Grenville : I am very glad that a law is coming into force to protect bees from the ravages of foul brood.

FROM THE AUGUST REPORT.

Mersea, Essex : In this section there is a good amount of sorghum grown and the syrup is made up for home use.

Raleigh, Kent : Quinces should find a place among your list of fruits. About 200 barrels are grown here annually for export. Pears are also receiving more attention.

Bayham, Elgin : I would suggest that we summer fallow more and more thoroughly in order to kill thistles and foul weeds, because it is plain to be seen that they are on the increase yearly throughout Ontario.

Southwold, Elgin : Dr. Barnardo and others engaged in bringing good boys and girls to assist on the farms of Ontario are doing a good work, and those who would attempt to deter them from their purpose are doing an injury to the unfortunate children as well as injustice to Canada.

Middleton, Norfolk : Much of the land surrounding Delhi is planted to corn, beans, pease, tomatoes, etc., in order to supply the Delhi canning factory.

Bosanquet, Lambton : Flax is a crop that is raised here, and a flax-mill is kept in operation.

Plympton, Lambton : If something is not done to prevent the spread of Canada thistles in this section in a few more years some farms will have nothing but thistles for a crop.

Sydenham, Grey : Canada thistles are not half so plentiful this year as last. Wild mustard seems to be on the increase, but there is a general tendency to clear the land from noxious weeds, and consequently stock is kept in better condition.

Innisfil, Simcoe : A big thunderstorm occurred on the 25th of July. Pieces of hail of enormous size fell, smashed most of the western windows in its track and destroyed much grain.

Dorchester N., Middlesex : The growth of thistles, rag-weed, ox-eye daisies, etc., is increasing, as the law appears to be a dead letter. Neighbors do not like to inform on neighbors, and the "inspection" is simply a humbug. At present there is across from my farm a field with enough thistles to seed the country.

Nissouri W., Middlesex : A severe wind and hail storm visited this township on the 25th day of July, covering a strip about a mile wide and destroying most of the crops in its course. There are hundreds of acres in which scarcely a peck of grain was left, and the straw was also much damaged.

Zorra E., Oxford : Considerable flax is grown in this township and is a good paying crop. The land is prepared by the owner and leased for the crop. The seed is found and sown and the crop harvested by the owners of the flax-mills. This year's crop is a very good one and will bring a large sum of money into the locality.

Peel, Wellington : Flax is extensively grown here and promises a good yield.

Dumfries N., Waterloo : The only suggestion I would mention is one in regard to the destruction of noxious weeds, thistles, etc., which are rapidly over-running the country.

Waterloo, Waterloo : "Union is strength." If the farmers were to unite and form unions as all other classes do they could accomplish a great deal. In this county we have a farmers' union of 1,000 members, divided into local unions, each with a local president and secretary, working under a general manager. It is this manager's duty to make bargains on large orders for the union and deal direct with manufacturers. This saves middlemen's profits, which go direct to the farmers. Over $4,000 worth of twine was bought by the union and over one ton of Paris green.

Woolwich, Waterloo : The Government should take steps to do away with the English sparrows which are getting very numerous in some places. They destroy a lot of grain. I have seen fields of grain which were half threshed out by them for two or three rods along the fences before the grain was cut, and after it was put up in shocks it was worse still. I think I am safe in saying that they destroyed from eight to twelve bushels of wheat for me this season, and now that the wheat is housed they are starting on the oats.

Grimsby N., Lincoln : I have noticed a very handsome plot of tobacco growing.

Uxbridge, Ontario : Roots and small fruits, such as strawberries and raspberries, are grown to a considerable extent of late years in this locality and pay the farmer better than grain, and the land is kept up much better.

Hallowell, Prince Edward : No "Hulless oats" have been grown this year. Farmers are now satisfied to leave such speculations alone. Several farmers in this county, however, have been duped by the fanning mill swindlers.

Sophiasburg, Prince Edward : A number of farmers are raising tomatoes for canning purposes, and sweet corn for the canning factory is also considered a good paying crop.

FROM THE NOVEMBER REPORT.

Colchester S., Essex : Tobacco growing is receiving more attention than for years. Several farmers have tried from two to nine acres with very gratifying results, so much so that their crop will doubtless be doubled another year. One grower has reported to me that he has raised over 1,100 lb. to the acre. Fruit growing, more especially in small fruits, is also receiving considerable attention.

Pelee Island, Essex : As fine tobacco is grown here as is seen in Virginia or Tenessee, and also broom corn of a superior description. No better sorghum is raised in Canada, and by repeated plantings it can be grown so as to be fit for manufacturing into syrup from the 20th of August until the 10th of November.

Harwich, Kent : Some tobacco is raised in this locality and it appears to pay well. The average yield per acre is about 1,000 lb., and it will sell for about 10 cents per lb.

Yarmouth, Elgin : I believe that our farmers should increase the number of their sheep. I have observed that farms where sheep have not been kept are getting much more full of foul weeds than are those farms where a flock can be seen. Sheep also distribute the manure more evenly over the land.

Dunn, Haldimand : The most of the ashes here are bought up and shipped to the United States. I believe they should be kept and used upon the farms here.

Stanley, Huron : We grow tobacco here which appears to do very well. It grows from 3 to 3½ feet high, and many of the leaves are about 30 inches long and 13 inches wide. It is chiefly used by the growers themselves who are principally French Canadians.

McGillivray, Middlesex : Flax is grown in this neighborhood and appears to have been a good crop.

Peel, Wellington : Flax has been grown in this locality to a considerable extent. It has been only an average crop this year, and was marketed at about $10 a ton.

Caistor, Lincoln : The greatest drawback to the sheep industry are dogs and the negligence of farmers to castrate their lambs at the proper time.

Markham, York : I consider poultry the best paying stock on the farm, taking into consideration the amount invested. Farmers should also raise more sheep.

Mara, Ontario : Rape is sown somewhat extensively in this township, and is used for fattening sheep, lambs and cattle in the fall of the year. It is also an excellent green manure when plowed under in the summer season.

Hallowell, Prince Edward : Hops are grown here quite extensively, and more persons are likely to go into raising them next year. An enormous quantity of strawberries are grown annually and canned by the factories. Various kinds of produce are canned in factories, pumpkins being in great demand.

Hillier, Prince Edward : Fancy pease is one of the leading cash crops in this locality, and they were a fair crop this year. This industry is represented by three firms who furnish the seed to farmers on contract for a stated price per bushel.

Osgoode, Carleton : Tobacco is grown extensively by the French Canadian farmers in this locality, and is said to be very profitable. Grass seed is also raised to a large extent by the same farmers. Maple syrup is also produced and is more profitable than our orchards of apple trees. Good plowing is the rule here, and is encouraged by the annual plowing match where a gold medal is given by one of our leading farmers for the best plowing, and plows are also offered in prizes by the leading plowmakers of the Ottawa valley.

Glamorgan, Haliburton : Stock-raisers should always raise flax, and with me it gives a good return. I do not utilise the stalks, but merely raise enough linseed for my own needs.

STATISTICS OF

THE WEATHER AND THE CROPS.

THE WEATHER.

TABLE I. Showing for each month the highest, lowest, mean highest, mean lowest, and mean temperature at the principal stations in Ontario in 1890; also the annual mean for each station.

	Temperature.	Saugeen.	Birnam.	London.	Wood-stock.	Stoney Creek.	Toronto.	Lindsay.	Graven-hurst.	Ottawa.	Rockliffe.
		°	°	°	°	°	°	°	°	°	°
January.	Highest	55.2	57.5	58.9	57.2	60.0	53.9	50.1	49.0	47.5	43.8
	Lowest	7.1	6.5	4.9	4.0	10.0	6.4	—5.5	-11.8	-20.4	-27.0
	Mean highest	35.7	36.0	39.3	37.3	39.2	36.9	30.3	33.1	25.5	23.3
	Mean lowest	20.3	24.6	22.4	21.0	26.1	20.3	13.3	12.2	3.8	—1.4
	Monthly mean	27.53	30.27	31.82	30.40	32.99	29.69	22.57	18.66	15.96	9.21
February.	Highest	56.0	58.2	58.6	55.9	61.0	53.8	42.5	46.0	45.0	45.8
	Lowest	5.2	5.5	10.0	6.0	9.0	3.0	—4.5	-13.8	-12 0	-31.4
	Mean highest	35.2	34.9	36.5	35.8	37.8	35.6	30.4	31.4	25.4	24.2
	Mean lowest	19.1	22.6	21.5	19.6	22.3	19.6	12.4	11.6	6.9	0.2
	Monthly mean	25.83	28.72	29.91	28.32	29.61	27.80	21.27	21.00	18.30	10.03
March.	Highest	49.0	54.0	49.0	53.6	59.0	53.5	43.0	49.0	48.2	43.3
	Lowest	-16.3	—9.0	—8.0	-10.5	1.0	—2.7	-13.4	-21.2	—8.8	-32.4
	Mean highest	33.0	32.6	34.6	34.8	37.1	34.7	32.0	35.3	33.8	30.9
	Mean lowest	16.6	19.6	20.3	17.3	23.3	20.9	12.7	12.7	14.8	5.0
	Monthly mean	23.00	26.09	28.28	27.08	29.99	27.57	22.24	21.79	24.39	16.44
April.	Highest	71.2	75.4	72.9	74.6	78.0	68.4	72.2	69.0	64.9	71.7
	Lowest	19.1	9.1	19.9	17.9	23.0	23.5	13.1	14.0	13.0	8.2
	Mean highest	49.6	54.2	55.6	54.9	55.7	51.6	52.8	50.7	49.3	48.5
	Mean lowest	31.0	32.0	33.4	31.1	36.6	32.8	29.4	29.9	29.7	25.9
	Monthly mean	38.92	43.16	46.09	43.72	46.09	42.31	40.33	38.83	39.64	36.08
May.	Highest	76.0	77.9	76.1	78.0	80.0	77.0	80.5	93.0	76.8	79.0
	Lowest	26.3	26.9	31.5	26.5	30.0	28.1	26.0	24.0	25.0	19.1
	Mean highest	57.4	60.9	61.6	61.3	61.6	58.9	60.6	59.7	61.3	58.7
	Mean lowest	38.7	40.9	43.4	40.1	43.5	41.1	38.1	49.1	40.5	35.2
	Monthly mean	47.07	50.80	53.91	51.63	52.26	50.01	48.57	48.37	50.31	47.11
June.	Highest	88.0	84.9	87.3	87.5	92.0	86.6	90.8	92.0	90.5	94.0
	Lowest	40.3	34.5	36.0	36.2	42.0	42.1	36.3	35.0	38.8	31.0
	Mean highest	72.8	77.6	77.8	78.1	78.9	74.8	77.7	78.2	75.4	77.2
	Mean lowest	53.0	55.1	55.7	54.4	59.1	56.5	54.0	53.1	54.1	49.1
	Monthly mean	62.53	66.30	66.67	67.95	69.34	63.31	65.42	65.77	64.37	62.57
July.	Highest	86.5	91.9	93.0	91.0	93.0	85.3	87.0	90.1	90.9	90.0
	Lowest	46.2	40.0	41.3	42.0	46.0	47.2	42.4	42.0	45.5	41.0
	Mean highest	74.8	79.8	79.2	79.1	83.4	77.1	77.8	77.6	79.4	77.9
	Mean lowest	57.5	55.2	55.5	54.7	61.3	58.0	55.7	56.4	57.3	53.3
	Monthly mean	65.46	67.47	67.21	68.23	71.64	67.34	66.02	66.88	67.42	64.18
August.	Highest	86.0	95.0	92.5	93.0	96.0	89.4	91.9	89.0	93.0	94.0
	Lowest	36.6	37.5	37.0	38 0	45.0	46.0	39.0	38.0	39.0	38.0
	Mean highest	72.2	74.1	73.5	75.0	76.5	73.1	73.8	74.3	74.3	73.6
	Mean lowest	54.3	52.8	52.7	51.2	57.6	55.9	51.6	55.3	54.0	49.4
	Monthly mean	61.43	63.45	63.20	64.17	67.19	64.49	61.89	62.40	64.14	58.27
Septem'r.	Highest	89.5	86.9	86.0	85.3	88.0	79.0	88.0	85.0	84.8	85.0
	Lowest	27.1	31.0	29.1	27.5	32.0	35.1	28.0	27.0	30.5	28.0
	Mean highest	66.7	68.5	68.9	69.0	71.4	66 6	68.2	70.0	68.0	67.4
	Mean lowest	46 6	46.9	46.5	44.8	49 7	48.6	44.9	45.5	46.4	42.4
	Monthly mean	54.15	57 66	59.39	57.42	59.71	57.46	56.07	55.41	56.08	51.18
October.	Highest	71.2	73.9	73.0	71.6	72.0	69.9	72.9	74.0	74.3	75.0
	Lowest	29.6	29.9	30.3	28.5	32.0	29.0	24.5	25.0	25.00	19.0
	Mean highest	55.2	55.1	55.4	54 2	58.5	54.6	54 0	55.9	53.6	52.2
	Mean lowest	42.1	40.7	41.0	39.0	44.0	42.4	37.8	39.2	38.4	35.6
	Monthly mean	46.34	47.94	48.88	47.50	51.42	48.27	45.04	45.74	45.76	41.42
Novemb'r.	Highest	58.0	61.7	61.0	59.5	62.0	59.0	57.0	54.0	57.2	50.0
	Lowest	16.1	19.0	12.2	13.0	16.0	15.9	5.0	7.0	7.5	-2.0
	Mean highest	47 6	44.6	46.0	44.4	46.9	43.7	40.4	42.1	38.8	35.9
	Mean lowest	29 7	30.9	30.3	26.6	33.6	30.4	24.8	25 2	24.2	20.1
	Monthly mean	35 52	37.76	38.80	37.38	41.19	37.00	32.48	32.67	31.13	27.57
Decemb'r.	Highest	47.9	41.3	40.0	39.1	44.0	41.1	36.6	39.0	38.0	36.0
	Lowest	—6 0	—2.0	—4.0	—2.8	0.0	—1.2	—9.8	-14.0	-17.0	-26.0
	Mean highest	33 2	30.0	31.1	29.8	33.4	30.2	24.5	23.9	16.8	16.7
	Mean lowest	15.1	16.2	16 3	13.9	19.9	14.9	6.0	5.0	—1.6	-6.2
	Monthly mean	22.79	23.12	24.99	23.62	27.10	23.00	15.75	15.21	8.00	4.08
	Annual mean	42.55	45.23	46.60	45 62	48.21	45.02	41.47	41.06	40.46	35.68

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TABLE II. Showing for each month the annual average of the highest, lowest, mean highest, mean lowest and mean temperature at the principal stations in Ontario derived from the nine years 1882-90; also the average annual mean at each station for the same period.

	Temperature.	Saugeen.	Birnam.	London.	Wood-stock.	Stoney Creek.	Toronto.	Lindsay.	Graven-hurst.	Ottawa.	Rockliffe.
		°	°	°	°	°	°	°	°	°	°
January.	Highest	45.9	47.2	47.8	47.4	52.3	45.1	42.7	43.0	40.7	39.5
	Lowest	-10.4	-11.0	—9.2	-15.2	—5.0	-10.1	-25.1	-28.7	-23.4	-36.8
	Mean highest	26.8	25.5	27.4	27.2	......	27.6	22.8	22.9	18.4	17.4
	Mean lowest	11.1	12.7	12.4	9.0	......	12.3	5.0	1.9	— 0.4	—7.7
	Monthly mean	19.49	19.08	20.87	19.51	22.51	20.52	14.18	13.46	9.67	5.79
February.	Highest	46.2	49.4	47.5	47.4	48.0	44.2	42.6	42.8	39.3	42.3
	Lowest	—9.7	-16.4	-11.8	-12.2	—6.6	—8.7	-17.7	-23.7	-22.4	-34.2
	Mean highest	27.4	27.2	28.8	29.2	......	29.0	25.7	25.4	20.8	21.0
	Mean lowest	10.9	11.7	11.5	9.8	......	12.8	5.0	3.7	0.9	—5.1
	Monthly mean	19.18	19.44	20.87	20.77	22.22	21.43	15.88	15.32	11.67	8.54
March.	Highest	49.4	55.1	52.9	53.2	55.1	50.0	46.7	46.6	43.6	46.5
	Lowest	— 6.8	—9.5	— 6.8	—7.2	2.1	0.2	-13.3	-17.0	-12.1	-25.9
	Mean highest	32.2	33.4	34.2	34.3	......	33.6	31.4	31.8	29.7	30.4
	Mean lowest	15.4	17.3	17.1	15.8	......	19.0	12.0	10.3	11.0	3.5
	Monthly mean	23.27	24.61	26.37	25.95	28.41	26.44	21.93	21.28	20.66	17.76
April.	Highest	73.7	78.9	77.2	76.9	78.9	69.1	74.3	69.8	72.8	72.9
	Lowest	12.7	13.6	17.3	15.4	23.3	20.8	11.9	8.8	11.0	3.5
	Mean highest	47.9	52.2	52.4	52.5	......	49.1	49.9	48.1	48.2	48.0
	Mean lowest	29.7	31.7	31.8	30.2	......	32.1	28.6	27.2	28.6	23.9
	Monthly mean	38.37	41.95	42.78	41.64	42.56	40.65	38.92	37.50	39.38	36.31
May.	Highest	78.6	83.0	80.4	80.1	82.4	75.8	81.4	81.9	81.1	85.2
	Lowest	27.4	27.6	30.6	28.8	36.3	31.2	27.1	26.2	29.6	23.4
	Mean highest	59.8	65.5	64.8	63.7	.....	61.0	64.4	63.1	65.4	63.8
	Mean lowest	39.9	42.3	43.8	41.4	.....	42.8	40.7	41.6	43.4	37.5
	Monthly mean	49.31	54 04	54.78	53.51	53.41	51.94	52.31	51.72	55.25	50.85
June.	Highest	83.9	87.3	85.6	87.3	89.3	83.9	88.6	87.8	87.7	88.9
	Lowest	37.2	35.8	39.7	37.8	46.1	42.2	37.1	36.6	40.2	33.9
	Mean highest	69.7	75.7	74.2	75.9	.....	72.4	75.6	74.3	75.6	74.4
	Mean lowest	49.5	52.1	53.3	51.6	...	52.7	50.2	50.9	53.1	47.5
	Monthly mean	59.40	63.88	64.46	64.44	64.95	62.39	62.80	62.46	65.40	60.76
July.	Highest	86.0	91.0	89.4	89.3	94.0	88.4	90.9	88.3	89.9	90.4
	Lowest	40.9	41.2	45.6	44.6	51.4	48.3	43.1	43.2	47.4	40.6
	Mean highest	73 7	80.1	78.2	79.4	......	77.2	79.5	77.8	78.7	77.4
	Mean lowest	54.0	55.2	56.7	54.6	.....	57.5	53.6	55.1	57.2	52.2
	Monthly mean	63.76	67.65	68.26	68.14	70.26	67.49	66 37	66.34	68.83	64.43
August.	Highest	85.7	90.1	87.6	89.5	91.7	86.5	90.1	88.1	88.5	89.1
	Lowest	39.6	38.3	40.0	41.4	47.7	45.7	38.1	40 0	42.0	37.6
	Mean highest	72.5	76.6	75.0	76.9	......	74 6	76.1	74.8	75.3	74.1
	Mean lowest	53.3	52.8	53.7	52.3	......	56.1	51.7	52.9	53.7	50 0
	Monthly mean	62.49	64.70	64.99	64.69	67.83	65.27	63.22	63.16	65.32	60.95
Septem'r.	Highest	84.1	87.0	84.3	86.3	88.7	81.1	85.9	83.4	82.9	83.8
	Lowest	31.6	31.8	32 5	30.3	36.9	36.4	29.3	31.2	30.7	29.0
	Mean highest	66.7	70.4	68.7	69.9	.....	67.4	68.9	68.2	67.2	66.7
	Mean lowest	47.0	48.1	48.9	45.6	....	49.1	44.4	45.4	46.0	42.2
	Monthly mean	56.23	59.33	58.72	58.25	60.44	58.30	55.94	56.05	56.90	53.05
October.	Highest	72.2	76.0	72.7	74.0	73.3	69.7	73.2	71.1	67.7	70.9
	Lowest	21.7	22.1	23.4	21.8	25.4	25.4	18.6	20.6	21.4	16.6
	Mean highest	54.4	55.9	54.9	55.4	......	53.9	53.7	53.9	51.2	51.1
	Mean lowest	37.8	38.6	37.4	36.0	......	38.7	34.5	36.1	34.2	32.0
	Monthly mean	45.37	47.27	46.26	46.09	47.97	46.56	43.21	43.99	43.67	40.79
Novemb'r.	Highest	61.5	63.9	62.1	62.5	65.0	59.7	61.0	60.5	58.3	56.5
	Lowest	11.4	13.9	13.9	10.1	17.7	13.3	3.1	6.2	4.2	—3.3
	Mean highest	42.9	43.1	44.0	42.9	......	42.8	40.2	40.9	38.2	36.6
	Mean lowest	29.3	30.4	29.6	27.2	.....	30.1	25.2	24.7	24.7	21.4
	Monthly mean	35.56	36.75	37.15	35.96	39.01	36.70	32.38	33.04	31.98	29.11
Decemb'r.	Highest	49.5	48.9	49.9	47.6	52.6	46.5	43.5	44.4	41.6	42.6
	Lowest	— 2.6	—3.4	— 4.1	— 6.7	3.3	—1.7	-15.0	-13.2	-16.5	-25.4
	Mean highest	32.8	32.0	33 4	32.0	......	33.0	28.3	29.0	23.9	24.1
	Mean lowest	19.8	19.9	19.4	17.1	...	20.1	12.4	12.9	7.6	3.6
	Monthly mean	26.38	25.97	27.18	25.77	29.77	27.08	21.02	21.90	16.52	14.07
	Annual mean	41.57	43.72	44.39	43.73	45.78	43.73	40.68	40.52	40.44	36.87

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TABLE III. Monthly summary of bright sunshine at the principal stations in Ontario in 1890, showing the number of hours the sun was above the horizon, the hours of registered sunshine, the total for the year; also the average derived for the nine years 1882-90.

Stations.		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for the year.
		hrs.	hrs	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
Hours of sun above horizon.		285.7	*291.4	369.9	406.4	461.6	465.7	470.9	484.5	376.3	340.2	286.9	274.3	4463.3
Woodstock..	1890...	45.1	56.4	126.6	199.0	182.6	253.5	289.8	240.5	197.2	71.2	97.7	70.6	1830.2
	1882-90	60.3	79.5	139.6	192.2	202.6	239.4	268.2	230.6	198.3	124.8	71.6	53.9	1861.0
Toronto .	1890...	59.9	52.8	144.4	229.3	184.7	265.7	304.3	249.5	209.4	86.8	106.8	84.0	1977.6
	1882-90	76.6	92.0	150.6	196.4	220.5	263.3	289.6	253.7	212.4	134.7	80.9	50.6	2021.3
Barrie...	1890...	45.6	57.0	112.1	169.1	143.7	238.4	243.1	218.7	169.5	74.4	74.6	62.1	1608.3
	1882-90	51.9	65.0	127.1	166.1	195.0	226.3	255.8	214.7	143.5	88.2	48.4	33.0	1615.0
Lindsay .	1890...	52.6	87.6	162.4	223.4	172.6	252.8	272.9	229.7	210.2	81.6	97.0	79.6	1922.4
	1882-90	75.6	95.9	159.3	205.5	218.4	257.3	280.9	236.1	205.2	126.8	76.2	54.9	1992.1
Kingston	1890...	49.5	91.0	165.2	229.0	189.0	263.3	292.0	234.8	189.4	111.4	92.4	93.4	2000.4
	1882-90	68.5	98.7	153.4	194.7	215.8	244.7	269.4	248.2	198.7	121.5	74.2	65.5	1953.3
Average for five stations.	1890...	50.5	69.0	142.1	210.0	174.5	254.7	280.4	234.6	195.2	85.1	93.7	77.9	1867.8
	1889...	67.4	94.4	152.9	189.1	199.9	164.4	284.3	227.6	185.9	119.8	63.7	66.5	1815.9
	1882-90	66.6	86.2	146.0	191.0	210.5	246.2	272.8	236.6	191.6	119.2	70.2	51.6	1888.5

* The average possible sunshine for February, 1882-90, was 293.9 hours.

TABLE IV. Monthly summary of inches of rain and snow precipitation in the several districts of Ontario in 1890; also the average derived for the nine years 1882-90.

Districts.		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total for the year.
West and south-west:		in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Rain....	1890-..	3.44	1.82	1.05	2.52	4.30	4.48	2.06	2.91	1.71	5.15	2.92	0.31	32.67
	1882-90	1.38	1.68	1.24	1.71	3.55	3.43	2.51	2.68	2.34	2.75	2.43	1.45	26.95
Snow.....	1890...	4.7	6.2	11.1	0.1	0.0	.....	....	....	....	S	2.9	25.1	50.1
	1882-90	16.8	11.2	10.7	3.6	0.1	......	....	....	....	0.2	6.2	15.5	64.3
North-west and north:														
Rain......	1890...	1.93	0.85	0.59	2.04	2.88	3.15	3.38	3.28	2.21	2.88	1.73	0.84	25.76
	1882-90	1.11	0.73	0.85	1.39	2.64	2.90	2.48	2.58	2.97	2.85	2.04	1.20	23.74
Snow. ...	1890....	25.5	20.7	17.5	1.1	2.7	.....	....	....	....	0.7	6.5	25.7	100.4
	1882-90	29.8	22.4	14.4	4.2	0.6	.. ..	....	.. .	....	1.4	13.8	22.3	108.9
Centre:														
Rain......	1890,...	2.78	1.88	0.86	1.94	3.05	4.14	2.24	3.09	2.04	4.94	3.38	0.13	30.47
	1882-90	1.34	1.34	1.09	1.58	2.73	3.16	2.30	2.32	2.42	2.44	2.30	1.37	24.39
Snow.....	1890 ...	8.9	9.1	10.8	0.1	0.0	.....	....	....	....	0.0	3.0	15.2	47.1
	1882-90	18.4	11.7	10.0	3.4	0.1	......	....	....	....	0.3	5.5	12.1	61.5
East and north-east:														
Rain......	1890....	2.19	1.86	0.74	1.80	2.72	3.23	3.47	3.59	2.16	1.91	1.82	0.10	25.59
	1882-90	1.06	0.85	0.85	1.40	2.51	2.88	2.89	2.63	2.57	2.09	1.96	1.04	22.73
Snow.....	1890...	12.6	15.4	13.1	0.4	S	......	.. .	....	....	0.0	4.9	14.2	60.6
	1882-90	22.4	18.8	14.2	5.2	0.3	......	....	....	....	0.5	9.1	14.7	85.2

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TABLE V. Summary of the total fall of rain and snow, and of the number of days on which rain or snow fell in Ontario during the years 1889 and 1890 at stations reporting for the whole year, and the average for the province.

Stations.	Observers.	Rain.				Snow.			
		1890.		1889.		1890.		1889.	
		Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.
ESSEX:									
Cottam	W. E. Wagstaff	33.36	114	28.98	73	33.7	25	12.9	9
Pelee Island	J. Quick	35.47	59	26.91	60	35.0	7	36.0	8
KENT									
Blenheim	W. R. Fellows	37.08	100	33.15	72	39.3	17	33.0	21
Chatham	W. D. A. Ross	38.14	108	25.79	73	29.1	22	30.2	29
Dealtown	S. J. Pardo	38.44	109	31.11	102	21.8	22	17.8	24
Ridgetown	T. Scane	36.47	132	27.41	115	48.7	35	15.5	30
ELGIN:									
Cowall	S. Maccoll	31.55	95	23.06	86	32.0	27	51.0	18
Lyons	Wm. McCredie	35.06	91	25.11	87	42.1	20	50.3	24
Port Stanley	M. Payne	33.74	164	30 38	142	64.1	67	64.7	65
NORFOLK:									
Port Dover	H. Morgan	34.31	160	22.43	122	34.7	48	41.8	46
WELLAND:									
Niagara Falls S.	E. Morden	35.75	110	31.23	93	35 7	28	46.0	24
LAMBTON:									
Birnam	J. S. Mellor	32.72	105	29.98	91	63.4	34	73.3	30
Oil Springs	A. Smyth	25.07	75	20.57	49	31.5	21	49.0	27
Sarnia	Wm. Mowbray	29.53	70	20.45	58	33.5	12	37.5	16
Thedford	Martin Wattson	35.63	104	26.46	101	48.5	34	63.5	25
Watford	D. Ross	29.39	75	26.97	68	......	......	......	...
Wyoming	J. Osborne	30.77	96	21.05	82	12.5	8	43.8	31
HURON:									
Goderich, L. H.	R. Campbell	24.01	84	22.78	74	83.5	38	90.5	32
Sunshine	G. Hood	27.34	99	28.82	91	60.7	44	98.1	40
Zurich	G. Hess	36.76	101	29.21	89	71.2	33	96.3	37
BRUCE:									
Lucknow	M. Macdonald	28.93	129	30.09	120	85.8	70	111.6	67
North Bruce	J. B. Muir	25.50	120	24.57	98	62.4	53	50.5	38
Point Clark	J. Ray	24.56	52	21.76	42	54.0	26	99.0	18
Saugeen	Mrs. J. R. Stuart	25.43	140	23.99	109	100.8	84	111.2	71
GREY:									
Bognor	C. H. Heming	27.37	124	21.86	62	111.8	56	88.5	24
Durham	J. Gunn, M.D.	26.48	113	22.22	96	144.0	80	26.0	52
Owen Sound	John McLean	28.95	79	24.50	62	103.0	38	110.9	36
Presque Isle	J. McKenzie	31.20	93	27.99	90	82.9	43	115.8	49
SIMCOE:									
Coldwater	J. B. Lazonby	26.44	97	23.58	76	103.9	52	122.6	56
Orillia	H. A. Fitton	23.16	104	20.98	105	96.0	68	129.0	68
MIDDLESEX:									
Coldstream	Daniel Zavitz	31.98	96	26.85	87	50.5	27	79.0	30
London	E. B. Reid & J. S. Dewar	30.94	109	24.43	107	71.0	52	123.0	36
Wilton Grove	H. Anderson	30.75	91	25.18	68	48.8	19	50.0	17
OXFORD:									
Princeton	D. Beamer	27.28	105	22.71	91	39.5	23	67.2	40
Woodstock	Prof. Wolverton	33.53	111	22.97	100	74.6	41	93.9	40
BRANT:									
Paris	John Kay	33.47	115	27.76	107	25.5	19	49.3	22
St. George	Dr. Kitchen	33.63	121	25.98	105	44.8	36	62.1	40
PERTH:									
St. Mary's	J. Thomson	34.90	97	28.85	88	57.5	24	77.0	35
WELLINGTON:									
Elora	T. Connor	33.97	78	28.62	69	39.2	33	54.0	29
Fergus	A. D. Ferrier	31.56	105	24.20	112	54.1	48	98 4	53
Guelph, O.A.C.	C. A. Zavitz	16.49	60	23.15	85	17.9	33	83.9	38

TABLE V. THE WEATHER.—*Continued.*

Stations.	Observers.	Rain.				Snow.			
		1890.		1889.		1890.		1889.	
		Inches.	Days.	Inches.	Days.	Inches.	Days.	Inches.	Days.
WATERLOO :									
Conestogo	G. A. McIntyre	31.22	119	24.76	102	41.1	62	68.8	50
DUFFERIN :									
Orangeville	N. Gordon	31.87	65	24.25	62	59.5	23	88.5	24
WENTWORTH :									
Stoney Creek	C. F. Van Wagner.	37.86	87	27.40	94	25.0	21	66.3	29
HALTON :									
Georgetown	J. Barber, jr	28.72	146	24.94	117	54.7	59	78.3	56
Nelson	J. Ireland	30.61	121	24.74	98	47.2	40	53.4	32
YORK :									
Aurora	Rev. R. W. Amos	25.56	90	22.76	79	57.7	42	62.2	25
Scarborough	R. Martin	30.42	124	25.42	118	42.2	50	42.8	51
Sharon	J. D. Graham	23.32	114	24.42	84	61.6	52	99.6	41
Toronto	Observatory	32.11	145	24.58	127	52.6	81	66.5	60
ONTARIO									
Oshawa	Rev. J. Middleton.	29.12	86	27.41	80	30.4	17	46.4	18
LENOX & ADDINGTON									
Denbigh	J. Lane	25.11	63	25.96	61	96.5	38	98.0	27
FRONTENAC :									
Kingston	A. P. Knight	26.29	131	26.71	124	69.1	71	88.4	49
GLENGARRY :									
Alexandria	J. Smith	30.10	125	24.21	107	97.2	71	87.3	55
CARLETON :									
Ottawa	Wm. T. Ellis	25.25	120	20.23	82	71.3	68	54.0	18
RENFREW :									
Clontarf	A. Schultz	24.40	93	22.78	103	89.1	68	97.5	46
Renfrew	A. F. Wright	17.15	76	22.66	73	67.0	38	78.7	23
Rockliffe	W. H. McIntyre	16.75	75	22.67	64	81.7	58	75.4	34
LANARK :									
Oliver's Ferry	W. J. McLean	25.36	78	25.73	73	54.0	15	65.0	26
VICTORIA :									
Lindsay	Thos. Beall	24.81	114	27.19	121	77.5	80	100.4	59
PETERBOROUGH :									
Ennismore	Thos. Tellford	30.04	109	27.15	97	59.5	45	69.5	51
Norwood	Rev. J. Carmichael	21.96	64	17.79	53	47.8	28	106.1	32
HALIBURTON :									
Haliburton	C. R. Stewart	21.32	94	24.13	94	59.3	66	82.9	48
HASTINGS :									
Bancroft	John Cleak	21.93	87	... .	.....	101.0	48	....	......
Deseronto	J. Russell	21.02	85	23.06	83	53.1	34	76.2	29
Shannonville	John Kemp	22.22	55	19.79	61	50.0	21	64.0	28
MUSKOKA :									
Bala	E. B. Sutton	30.69	133	25.53	117	74.6	58	85.7	63
Beatrice	J. Hollingworth	27.38	104	25.27	99	89.8	28	105.0	41
Charlinch	C. J. Tisdall	30.24	117	27.81	116	89.8	80	96.6	62
Gravenhurst	T. M. Robinson	21.61	84	24.81	92	83.0	45	100.5	45
PARRY SOUND :									
Lynch Lake	G. Ambury	30.38	115	23.13	108	153.1	73	122.7	76
Parry Sound	Rev. R. Mosely	29.37	127	24.55	108	100.7	73	88.7	68
Sprucedale	A. McKenzie	29.39	68	24.92	65	76.3	28	72.0	23
Upland	P. Macdonald	38.85	113	33.75	111	108.7	72	104.8	67
ALGOMA :									
Cartier	Agent C.P.R.	19.12	70	23.75	85	132.0	56	85.0	50
Port Arthur	W. P. Cooke	16.49	74	18.40	91	36.8	50	61.0	45
Savanne	Agent C.P.R.	9.94	45	12.02	39	95.0	51	145.2	47
White River	" "	13.57	93	18.77	86	116.7	107	144.1	89
Average for the Province		28.44	100	24.90	89	64.8	44	76.1	39

THE WEATHER.

TABLE VI. Comparative Meteorological Register for the seven years 1884-90 as recorded at Toronto Observatory, in Latitude 43° 39.4' North and Longitude 5h. 17m. 34.65s. West.

Register.	1890.	1889.	1888.	1887.	1886.	1885.	1884.
	°	°	°	°	°	°	°
Average temperature	45.02	45.44	42.70	44.14	43.71	41.57	43.79
Difference from average (50 years)	+ 0.91	+ 1.33	— 1.41	+ 0.03	— 0.40	— 2.54	— 0.32
Thermic anomaly (Lat. 43° 40')	— 6.00	— 5.58	— 8.32	— 6.88	— 7.31	— 9.45	— 7.23
Highest temperature	89.4	88.7	92.0	97.2	89.5	88.6	89.6
Lowest temperature	— 2.7	—11.3	—16.1	—16.6	—22.8	—16.1	—13.3
Annual range	92.1	100.0	108·1	113.8	112.3	104.7	102.9
Average daily range	16.22	15.55	16.55	17.12	16.53	16.85	17.05
Greatest daily range	36.0	42.8	37.7	34.0	32.6	39.2	34.8
Average height of bar. at 32° Fah	29.6313	26.6177	29.6448	29.6329	20.6255	29.5933	29.6273
Difference from average (49 years)	+ .0129	— .0007	+ .0264	+ .0145	+ .0071	— .0251	+ .0089
Highest barometer	30.334	30.365	30.432	30.607	30.283	30.300	30.412
Lowest barometer	28.762	28.582	28.793	28.704	28.752	28.714	28.807
Monthly and annual ranges	1.572	1.783	1.639	1.903	1.531	1.586	1.605
Average humidity of the air	78	77	74	75	77	77	76
Difference from average	+ 1	0	- 3	— 2	0	0	— 1
Average elasticity of aqueous vapor	0.272	0.271	0.243	0.261	0.260	0.249	0.261
Average of cloudiness	0.62	0.63	0.63	0.63	0.61	0.61	0.63
Difference from average (36 years)	.00	+ .01	+ .01	+ .01	— .01	— .01	+ .01
Resultant direction of wind	N 48 W	N 63 W	N 59 W	N 46 W	N 56 W	N 62 W	N 55 W
" velocity of the wind	1.80	2.04	2.67	1.92	2.13	2.60	3.30
Average velocity (miles per hour)	9.19	9.08	9.71	9.88	9.73	9.95	10.29
Difference from average (15 years)	— 0.45	— 0.56	+ 0.07	+ 0.24	+ 0.09	+ 0.31	+ 0.65
Total amount of rain in inches	32.110	24.575	22.819	17.969	27.726	26.351	20.532
Difference from average (50 years)	+ 4.792	— 2.743	— 4.499	— 9.349	+ 0.408	— 0.967	— 6.786
Number of days of rain	145	127	133	106	112	103	123
Total amount of snow in inches	52.6	66.5	34.6	77.9	73.5	65.6	80.2
Difference from average (47 years)	—17.6	— 3.7	—35.6	+ 7.7	+ 3.3	— 4.6	+10.0
Number of days of snow	81	60	83	78	66	73	69
Number of fair days	159	187	175	203	196	203	184
Number of days completely clouded	68	79	58	76	74	65	89
Number of auroras observed	7	6	21	25	29	31	20
Possible to see auroras (No. of nights)	188	169	183	180	189	195	202
Number of thunder storms	21	24	23	22	26	19	30
Number of fogs	43	34	26	39	29	30	45
Number of hours of bright sunshine	1977.6	1909.2	2048.3	2063.5	2034.4	2018.3	1931.8
Difference from average (9 years)	—43.7	—112.1	+27.0	+42.2	+13.1	— 3.0	—89.5
Number of hours of possible sunshine	4463.3	4463.3	4474.4	4463.3	4463.3	4463.3	4474.4

RURAL AREA.

TABLE VII. Showing by County Municipalities and groups of counties the Rural Area of Ontario as returned by municipal assessors for 1890.

Counties.	Acres of assessed land.			Acres cleared.		Acres woodland.	Acres swamp, marsh or water.	Per cent. cleared.
	Resident.	Non-resident.	Total occupied.	1890.	1889.			
Essex	409,537	20,618	430,155	212,120	202,984	197,986	20,049	49.3
Kent	542,035	21,591	563,626	304,453	294,498	239,034	20,139	54.0
Elgin	434,884	2,687	437,571	279,298	273,754	145,415	12,858	63.8
Norfolk	390,583	6,567	397,150	234,108	231,432	133,714	29,328	58.9
Haldimand	280,161	13	280,174	204,371	201,729	63,883	11,920	72.9
Welland	220,763	6,378	227,141	163,475	162,387	53,467	10,199	72.0
Totals	2,277,963	57,854	2,335,817	1,397,825	1,366,784	833,499	104,493	59.8
Lambton	633,123	26,412	659,535	306,379	295,376	343,042	10,114	46.5
Huron	788,511	10,459	798,970	563,959	554,226	138,776	96,235	70.6
Bruce	789,966	26,378	816,344	458,363	452,162	254,017	103,964	56.1
Totals	2,211,600	63,249	2,274,849	1,328,701	1,301,764	735,835	210,313	58.4
Grey	1,029,194	29,763	1,058,957	559,481	551,648	341,481	157,995	52.8
Simcoe	897,173	56,413	953,586	482,378	475,507	433,150	38,058	50.6
Totals	1,926,367	86,176	2,012,543	1,041,859	1,027,155	774,631	196,053	51.8
Middlesex	748,546	8,179	756,725	534,229	528,082	209,050	13,446	70.6
Oxford	470,655	949	471,604	346,886	343,550	96,586	28,132	73.6
Brant	213,716	2,325	216,041	171,136	172,562	25,294	19,611	79.2
Perth	512,741	5,102	517,843	365,633	363,787	97,300	54,910	70.6
Wellington	622,157	5,281	627,438	440,351	440,667	102,729	84,358	70.2
Waterloo	300,825	5,206	306,031	239,921	234,979	48,754	17,356	78.4
Dufferin	341,474	13,097	354,571	194,853	187,977	77,717	82,001	55.0
Totals	3,210,114	40,139	3,250,253	2,293,009	2,271,604	657,430	299,814	70.5
Lincoln	187,483	4,074	191,557	153,241	147,542	36,146	2,170	80.0
Wentworth	270,291	3,143	273,434	209,240	207,559	41,555	22,639	76.5
Halton	222,791	935	223,726	169,726	165,388	39,389	14,611	75.9
Peel	287,999	203	288,202	241,351	238,290	31,971	14,880	83.7
York	526,841	7,774	534,615	410,287	407,599	67,638	56,690	76.7
Ontario	484,581	14,195	498,776	340,473	335,463	93,031	65,272	68.3
Durham	366,774	1,943	368,717	272,581	273,509	67,590	28,546	73.9
Northumberland	429,248	4,625	433,873	321,327	313,987	88,622	23,924	74.1
Prince Edward	228,553	3,089	231,642	182,393	181,481	39,423	9,826	78.7
Totals	3,004,561	39,981	3,044,542	2,300,619	2,270,818	505,365	238.558	75.6
Lennox & Addington	369,884	44,941	414,825	204,917	206,312	121,983	87,925	49.4
Frontenac	579,779	98,568	678,347	219,811	214,396	294,688	163,848	32.4
Leeds and Grenvllle.	732,177	8,427	740,604	419,125	417,175	203,498	117,981	56.6
Dundas	234,557	2,500	237,057	135,841	134,166	64,692	37,524	57.3
Stormont	248,909	2,666	251,575	117,631	115,779	114,711	19,233	46.8
Glengarry	287,288	35	287,323	147,294	146,322	121,887	18,142	51.3
Prescott	263,810	21,711	285,521	138,491	137,127	118,015	29,015	48.5
Russell	237,297	15,278	252,575	80,516	75,548	151,435	20,624	31.9
Carleton	550,289	11,533	561,822	289,943	285,941	142,314	129,565	51.6
Renfrew	862,715	31,863	894,578	262,716	262,561	554,678	76,184	29.4
Lanark	635,159	34,088	669,247	285,151	289,102	264,770	119,326	42.6
Totals	5,001,864	271,610	5,273,474	2,301,436	2,284,429	2,152,671	819,367	43.6
Victoria	503,619	67,056	570,675	244,356	238,282	183,208	143,111	42.8
Peterborough	514,120	26,925	541,045	232,351	221,723	249,276	59,418	42.9
Haliburton	544,554	17,481	562,035	29,907	29,695	498,321	33,807	5.3
Hastings	909,342	66,092	975,434	332,858	334,750	497,313	145,263	34.1
Totals	2,471,635	177,554	2,649,189	839,472	824,450	1,428,118	381,599	31.7
Muskoka	445,613	69,363	514,976	55,708	52,686	396,994	62,274	10.8
Parry Sound	415,797	39,433	455,230	41,985	35,817	375,082	38,163	9.2
*Nipissing	143,341	26,175	169,516	11,333	8,632	152,446	5,737	6.7
†Algoma	346,271	91,621	437,892	46,752	40,969	331,376	59,764	10.7
Totals	1,351,022	226,592	1,577,614	155,778	138,104	1,255,898	165,938	9.9
The Province. 1890	21,455,126	963,155	22,418,281	11,658,699	11,485,108	8,343,447	2,416,135	52.0
The Province. 1889	21,294,019	984,619	22,278,638	....	....	8,451,181	2,342,349	51.5

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* Not including the organised township of McKim.

† Not including the acreages of the organised townships of Keewatin, Neebing, Rat Portage and Shuniah.

AREA AND PRODUCE—FALL WHEAT.

TABLE VIII. Showing by County Municipalities and groups of Counties the area and produce of Fall Wheat in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	25,954	428,241	16.5	29,302	460,041	15.7	31,127	609,295	19.6
Kent	48,259	965,180	20.0	57,542	840,113	14.6	59,240	1,159,579	19.6
Elgin	39,096	836,654	21.4	38,603	629,229	16.3	43,435	843,696	19.4
Norfolk	30,579	617,696	20.2	31,536	460,426	14.6	32,729	584,795	17.9
Haldimand	29,515	442,725	15.0	33,409	481,090	14.4	32,736	528,172	16.1
Welland	20,313	345,321	17.0	19,082	284,322	14.9	22,238	358,707	16.1
Totals	193,716	3,635,817	18.8	209,474	3,155,221	15.1	221,505	4,084,244	18.4
Lambton	29,998	545,964	18.2	36,535	610,135	16.7	34,447	651,547	18.9
Huron	44,978	989,516	22.0	53,582	723,357	13.5	65,064	1,274,988	19.6
Bruce	32,789	711,521	21.7	37,084	478,384	12.9	46,738	899,231	19.2
Totals	107,765	2,247,001	20.9	127,201	1,811,876	14.2	146,249	2,825,766	19.3
Grey	18,759	333,910	17.8	25,426	333,081	13.1	26,600	514,968	19.4
Simcoe	47,946	872,617	18.2	56,082	1,003,868	17.9	53,632	1,107,819	20.7
Totals	66,705	1,206,527	18.1	81,508	1,336,949	16.4	80,232	1,622,787	20.2
Middlesex	60,169	1,365,836	22.7	59,411	879,283	14.8	71,512	1,407,630	19.7
Oxford	33,927	800,677	23.6	34,286	582,862	17.0	38,401	769,246	20.0
Brant	21,398	468,616	21.9	21,437	342,992	16.0	28,789	533,412	18.5
Perth	29,642	637,303	21.5	39,474	528,952	13.4	43,755	859,752	19.6
Wellington	12,102	231,148	19.1	16,672	253,414	15.2	24,914	494,306	19.8
Warerloo	32,550	696,570	21.4	36,128	610,563	16.9	39,013	801,145	20.5
Dufferin	4,894	89,071	18.2	4,747	66,933	14.1	9,955	190,602	19.1
Totals	194,682	4,289,221	22.0	212,155	3,264,999	15.4	256,339	5,056,093	19.7
Lincoln	18,186	318,255	17.5	18,764	335,876	17.9	21,262	382,800	18.0
Wentworth	23,755	406,211	17.1	23,679	367,025	15.5	30,032	550,088	18.3
Halton	16,284	260,544	16.0	20,415	453,213	22.2	21,419	412,982	19.3
Peel	16,129	288,709	17.9	22,804	433,276	19.0	25,380	535,809	21.1
York	24.134	514,054	21.3	29,855	638,897	21.4	35,650	782,327	21.9
Ontario	4,153	88,044	21.2	5.307	93,934	17.7	8,990	198,033	22.0
Durham	4,242	92,900	21.9	5,603	85,166	15.2	3,670	74,526	20.3
Northumberland	12,873	262,609	20.4	17,960	237,072	13.2	11,296	229,260	20.3
Prince Edward	3,345	76,935	23.0	1,863	41,918	22.5	2,231	40,062	18.0
Totals	123,101	2,308,261	18.8	146,250	2,686,377	18.4	159,930	3,205,887	20.0
Lennox and Addington	2,651	50,369	19.0	2,649	49,536	18.7	2,144	37,769	17.6
Frontenac	707	10,888	15.4	947	15,247	16.1	1,656	30,669	18.5
Leeds and Grenville	2,672	40,614	15.2	3,790	68,220	18.0	4,875	89,214	18.3
Dundas	285	4,275	15.0	353	7,237	20.5	1,025	18,389	17.9
Stormont	127	1,524	12.0	138	2,470	17.9	612	11,083	18.1
Glengarry	65	813	12.5	104	1,872	18.0	543	8,891	16.4
Prescott	45	540	12.0	....	....	.....	71	882	12.4
Russell	27	592	16.0	265	4,240	16.0	209	3,693	17.7
Carleton	778	14,938	19.2	373	6,677	17.9	1,423	21,339	15.0
Renfrew	418	7,942	19.0	214	5,050	23.6	896	15,885	17.7
Lanark	2,177	27,430	12.6	3,688	70,810	19.2	3,089	58,259	18.9
Totals	9,952	159,925	16.1	12,521	231,359	18.5	16,543	296.073	17.9
Victoria	2,825	43,223	15.3	5,592	76,610	13.7	7,951	156,275	19.7
Peterborough	8,355	132,845	15.9	13,495	160,591	11.9	10,186	198,507	19.5
Haliburton	271	3,686	13.6	225	3,218	14.3	134	2,080	15.5
Hastings	11,825	224,675	19.0	13,017	264,245	20.3	9,100	177,301	19.5
Totals	23,276	404,429	17.4	32,329	504,664	15.6	27,371	534,163	19.5
Muskoka	32	480	15.0	106	1,855	17.5	65	1,123	17.3
Parry Sound	157	1,963	12.5	30	450	15.0	48	771	16.1
Nipissing	20	276	13.8	....	....	.....	2	31	13.8
Algoma	695	13,483	19.4	541	8,115	15.0	439	8,602	19.6
Totals	904	16,202	17.9	677	10,420	15.4	554	10,527	19.0
The Province	720,101	14,267,383	19.8	822,115	13,001.865	15.8	908,723	17,635,540	19.4

AREA AND PRODUCE—SPRING WHEAT.

TABLE IX. Showing by County Municipalities and groups of Counties the area and produce of Spring Wheat in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	2,907	38,663	13.3	679	8,963	13.2	1,671	25,020	15.0
Kent	10,243	146,474	14.3	2,149	37,608	17.5	3,524	54,973	15.6
Elgin	1,436	23,407	16.3	491	7,414	15.1	1,694	26,036	15.4
Norfolk	769	10,535	13.7	440	6,028	13.7	823	11,751	14 3
Haldimand	7,299	81,019	11.1	1,894	23,107	12.2	3,278	43,743	13.3
Welland	894	10,549	11.8	258	2,683	10.4	1,431	19,833	13.9
Totals	23,548	310,647	13.2	5,911	85,803	14.5	12,421	181,356	14.6
Lambton	7,098	107,180	15.1	1,714	22,796	13.3	6,309	91,957	14.6
Huron	9,379	152,878	16.3	2,235	29,279	13.1	16,495	222,432	13.5
Bruce	13,768	209,274	15.2	8,017	97,006	12.1	13,458	187,193	13.9
Totals	30,245	469,332	15.5	11,966	149,081	12.5	36,262	501,582	13.8
Grey	33,734	448,662	13.3	23,116	286,638	12.4	40,440	563,998	13.9
Simcoe	36,774	485,417	13.2	30,898	451,111	14.6	34,966	528,336	15.1
Totals	70,508	934,079	13.2	54,014	737,749	13.7	75,406	1,092,334	14.5
Middlesex	4,936	85,393	17.3	1,216	18,483	15.2	10,487	159,347	15.2
Oxford	7,168	117,555	16.4	1,543	25,151	16.3	9,195	148,379	16.1
Brant	1,563	26,415	16.9	53	832	15.7	1,214	16,917	13.9
Perth	9,900	172,260	17.4	1,853	31,872	17.2	12,144	179,140	14.8
Wellington	20,826	366,538	17.6	8,103	123,166	15.2	20,034	293,200	14.6
Waterloo	2,846	47,528	16.7	361	5,776	16.0	4,822	71,156	14.8
Dufferin	24,810	377,112	15.2	19,077	221,293	11.6	20,766	295,930	14.3
Totals	72,049	1,192,801	16.6	32,206	426,573	13.2	78,662	1,164,069	14.8
Lincoln	3,017	34,997	11.6	888	11,810	13.3	2,185	31,643	14.5
Wentworth	5,135	73,431	14.3	907	11,700	12.9	2,723	40,558	14.9
Halton	8,820	121,716	13.8	2,540	42,672	16.8	3,952	59,293	15.0
Peel	22,470	343,791	15.3	8,822	140,270	15.9	13,267	219,047	16.5
York	32,894	427,622	13.0	20,524	320,174	15.6	26,392	442,525	16.8
Ontario	51,289	538,535	10.5	41,582	681,945	16.4	46,943	789,381	16.8
Durham	35,779	379,257	10.6	25,507	390,257	15.3	36,550	587,536	16.1
Northumberland	29,210	315,468	10.8	18,190	203,728	11.2	27,596	379,181	13.7
Prince Edward	6,884	88,804	12.9	3,716	39,390	10.6	6,543	89,359	13.7
Totals	195,498	2,323,621	11.9	122,676	1,841,946	15.0	166,151	2,638,523	15.9
Lennox and Addington	6,510	67,053	10.3	2,689	35,495	13.2	5,970	85,917	14.4
Frontenac	9,398	98,679	10.5	8,536	92,189	10.8	8,720	127,791	14.7
Leeds and Grenville	13,181	127,856	9.7	10,731	123,407	11.5	13,161	204,681	15.6
Dundas	4,236	56,339	13.3	3,811	51,449	13.5	4,584	85,828	18.7
Stormont	4,073	56,207	13.8	4,657	58,213	12.5	4,477	79,782	17.8
Glengarry	7,967	91,621	11.5	7,589	103,969	13.7	7,898	127,259	16.1
Prescott	9,060	122,310	13.5	7,904	81,411	10.3	8,218	128,725	15.7
Russell	3,559	48,402	13.6	3,469	48,219	13.9	4,039	67,518	16.7
Carleton	25,165	269,266	10.7	19,223	349,859	18.2	21,800	366,573	16.8
Renfrew	26,482	325,729	12.3	23,446	459,542	19.6	24,455	399,614	16.3
Lanark	16,029	144,261	9.0	14,443	155,984	10.8	14,504	210,396	14.5
Totals	125,660	1,407,723	11.2	106,498	1,559,737	14.6	117,826	1,884,084	16.0
Victoria	35,477	457,653	12.9	25,336	364,838	14.4	32,048	474,935	14.8
Peterborough	28,920	335,472	11.6	22,515	279,186	12.4	25,638	342,874	13.4
Haliburton	1,940	21,340	11.0	1,291	20,398	15.8	1,366	17,574	12.9
Hastings	10,464	122,429	11.7	9,740	117,854	12.1	14,853	224,710	15.1
Totals	76,801	936,894	12.2	58,882	782,276	13.3	73,905	1,060,093	14.3
Muskoka	1,208	16,550	13.7	886	12,050	13.6	1,372	20,251	14.8
Parry Sound	1,143	13,145	11.5	569	7,454	13.1	1,384	22,097	16.0
Nipissing	260	3,718	14.3	....	....	......	29	413	14.3
Algoma	4,833	75,395	15.6	5,002	95,038	19.0	6,008	115,025	19.1
Totals	7,444	108,808	14.6	6,457	114,542	17.7	8,793	157,786	17.9
The Province	601,753	7,683,905	12.8	398,610	5,697,707	14.3	569,426	8,679,827	15.2

AREA AND PRODUCE.—BARLEY.

TABLE X. Showing by County Municipalities and groups of Counties the area and produce of Barley in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Arces.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	7,894	177,616	22.5	4,289	103,365	24.1	3,325	86,457	26.0
Kent	8,739	209,736	24.0	8,985	252,479	28.1	6,734	181,850	27.0
Elgin	8,055	190,904	23.7	4,327	113,800	26.3	4,804	128,731	26.8
Norfolk	6,088	130,283	21.4	6,418	140,554	21.9	6,171	157,189	25.5
Haldimand	12,672	198,950	15.7	13,014	287,609	22.1	14,209	317,213	22.3
Welland	3,597	58,991	16.4	3,037	67,118	22.1	3,798	87,960	23.2
Totals	47,045	966,480	20.5	40,070	964,925	24.1	39,041	959,400	24.6
Lambton	17,339	360,651	20.8	15,331	389,407	25.4	14,890	384,229	25.8
Huron	32.386	819,366	25.3	32,886	861,613	26.2	27,897	764.596	27.4
Bruce	16,622	433,834	26 1	21,691	483,709	22.3	19,108	494,756	25.9
Totals	66,347	1,613,851	24.3	69,908	1,734,729	24.8	61,895	1,643,581	26.6
Grey	15,726	396,295	25.2	20,142	443,124	22.0	22,500	552,066	24.5
Simcoe	30,632	722,915	23.6	40,301	1,092,157	27.1	31,323	806,254	25.7
Totals	46,358	1,119,210	24.1	60,443	1,535,281	25.4	53,823	1,358,320	25.2
Middlesex	17,752	434,924	24.5	16,433	404,252	24.6	15,392	406,242	26.4
Oxford	16,542	453,251	27.4	18,557	519,596	28.0	17,019	507,053	29.8
Brant	22,046	540,127	24.5	25,298	715,933	28.3	19,029	517,419	27.2
Perth	18,499	514,272	27.8	17,728	540.704	30.5	17,725	521,933	29.4
Wellington	34,022	932,203	27.4	43,289	1,320,315	30.5	35,779	1,010,069	28.2
Waterloo	20,843	619,037	29.7	21,268	686.956	32.3	17,047	522,355	30.6
Dufferin	12,502	312,550	25.0	14,307	346,229	24.2	12,024	305,773	25.4
Totals	142,206	3,806,364	24.8	156,880	4,533,985	28.9	134,015	3,790,844	28.3
Lincoln	5,315	101,517	19.1	5,103	116.859	22.9	4,454	109,466	24.6
Wentworth	15,466	335,612	21.7	17,238	436,121	25.3	13,306	365,544	27.5
Halton	12,018	288,432	24.0	16,067	485,223	30.2	13,194	368,973	28.0
Peel	36,832	865,552	23.5	45,932	1,336,621	29.1	35,730	981,913	27.5
York	51,041	1,117,798	21.9	69,073	2,155,078	31.2	57,243	1,648,561	28.8
Ontario	34,162	717.402	21.0	49,535	1,466,236	29.6	38,940	1,097,803	28.2
Durham	37,797	650,108	17.2	54,724	1,532,272	28.0	46,670	1,232,523	26.4
Northumberland	32,423	573,887	17.7	51,234	1,168,135	22.8	45,022	1,004,630	22.3
Prince Edward	31,699	618,131	19.5	43,772	1,063,660	24.3	40,218	827,588	20.6
Totals	256,753	5,268,439	20.5	352,678	9,760,205	27.7	294,777	7,637,001	25.9
Lennox and Addington	25,854	447,274	17.3	38,464	950,061	24.7	38,873	851,769	21.9
Frontenac	12,529	236,798	18.9	20,499	412,030	20.1	17,956	406,886	22.7
Leeds and Grenville	8,327	151,551	18.2	10,795	249,365	23.1	10,738	264,527	24.6
Dundas	5,336	108,321	20.3	5,741	136,636	23.8	6,608	192,912	29.2
Stormont	3,289	74,003	22.5	1,935	49,343	25.5	2,400	65,249	27.2
Glengarry	2,466	50,306	20.4	2,591	58,298	22.5	2,242	51,085	22.8
Prescott	5,005	110,110	22.0	4,233	108,788	25.7	3,021	79,543	26.3
Russell	2,222	52,439	23.6	1,849	52,881	28.6	1,541	37,819	24.5
Carleton	9,353	231,954	24.8	9,418	271,238	28.8	8,039	231,248	28.8
Renfrew	1,681	31,771	18.9	2,045	64,009	31.3	1,469	35,331	24.1
Lanark	3,554	75,345	21.2	3,975	109,313	27.5	2,925	75,731	25.9
Totals	79,616	1,569,872	19.7	101,545	2,461,962	24.2	95,812	2,292,100	23.9
Victoria	25,692	565,224	22.0	37,176	1,003,752	27.0	30,659	769,979	25.1
Peterborough	7,924	159,272	20.1	14,834	375,300	25.3	13,287	320,130	24.1
Haliburton	308	6,252	20.3	274	6,987	25.5	281	6,672	23.7
Hastings	26,848	477,894	17.8	39,988	975,707	24.4	38,977	885,587	22.7
Totals	60,772	1,208,642	19.9	92,272	2,361,746	25.6	83,204	1,982,368	23.8
Muskoka	568	11,360	20.0	451	9,381	20.8	535	11,516	21.5
Parry Sound	755	16,459	21.8	474	10,049	21.2	661	15,038	22.8
Nipissing	191	4,326	22.3	....	....	......	21	480	22.3
Algoma	712	15,166	21.3	565	14,125	25.0	581	15,086	26.0
Totals	2,229	47,311	21.2	1,490	33,555	22.5	1,798	42,120	23.4
The Province	701,326	15,600,169	22.2	875,286	23,386,388	26.7	764,365	19,705,734	25.8

AREA AND PRODUCE.—OATS.

TABLE X'I. Showing by County Municipalities and groups of Counties the area and produce of Oats in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years, 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	40,809	1,048,791	25.7	33,899	1,159,346	34.2	30,554	1,153,952	37.8
Kent	35,034	1,005,476	28.7	36,066	1,395,754	38.7	32,886	1,301,630	39.6
Elgin	34,638	886,733	25.6	35,743	1,179,519	33.0	32,662	1,218,548	37.3
Norfolk	28,135	602,089	21.4	28,541	713,525	25.0	26,869	847,818	31.6
Haldimand	25,548	505,850	19.8	27,905	798,083	28.6	23,031	746,902	32.4
Welland	21,642	380,899	17.6	22,810	670,614	29.4	19,774	608,565	30.8
Totals	185,806	4,429,838	23.8	184,964	5,916,841	32.0	165,776	5,877,415	35.5
Lambton	55,419	1,344,149	24.7	46,396	1,503,230	32.4	40,977	1,456,480	35.5
Huron	94,630	2,952,456	31.2	95,918	3,194,069	33.3	78,662	2,860,364	36.4
Bruce	73,700	2,211,000	30.0	75,463	1,939,399	25.7	61,165	1,970,117	32.2
Totals	223,749	6,507,605	29.1	217,777	6,636,698	30.5	180,804	6,286,961	34.8
Grey	101,957	3,028,123	29.7	114,396	3,409,001	29.8	88,888	2,805,811	31.6
Simcoe	75,668	2,292,740	30.3	78,390	2,884,752	36.8	64,608	2,191,339	33.9
Totals	177,625	5,320,863	30.0	192,786	6,293,753	32.6	153,496	4,997,150	32.6
Middlesex	84,083	2,522,490	30.0	87,854	3,074,890	35.0	73,440	2,770,967	37.7
Oxford	58,287	1,731,124	29.7	62 828	2,293,222	36.5	53,217	2,024,402	38.0
Brant	20,690	587,596	28.4	19,184	671,440	35.0	18,251	659,125	36.1
Perth	68,435	2,436,286	35.6	68,184	2,706,905	39.7	57,046	2,311,265	40.5
Wellington	91,045	2,968,067	32.6	88,695	3,538,931	39.9	72,253	2,642,366	36.6
Waterloo	44,317	1,316,215	29.7	40,464	1,513,354	37.4	35,932	1,337,095	37.2
Dufferin	40,040	1,057,056	26.4	35,410	1,193,317	33.7	29,954	1,010,792	33.7
Totals	406,897	12,618,834	31.0	402,619	14,992,059	37.2	340,093	12,756,012	37.5
Lincoln	20,232	418,802	20.7	17,467	534,490	30.6	17,815	583,689	32.8
Wentworth	30,455	785,739	25.8	32,400	949,320	29.3	28,832	1,037,447	36.0
Halton	22,443	626,160	27.9	21,926	835,381	38.1	19,040	682,716	35.9
Peel	37,109	1,105,848	29.8	36,319	1,430,969	39.4	29,791	1,103,329	37.0
York	76,512	2,433,082	31.8	72,099	2,912,800	40.4	63,679	2,528,619	39.7
Ontario	54,935	1,659,037	30.2	59,267	2,441,800	41.2	49,297	1,879,508	38.1
Durham	36,511	938,333	25.7	37,726	1,331,728	35.3	33,784	1,188,536	35.2
Northumberland	34,521	869,929	25.2	34,088	1,032,866	30.3	30,322	896,035	29.6
Prince Edward	14,488	378.137	26.1	13,592	400,964	29.5	13,571	376,690	27.8
Totals	327,206	9,215,067	28.2	324,884	11,870,318	36.5	286,131	10,276,569	35.9
Lennox and Addington	25,212	562,228	22.3	24,704	741,120	30.0	22,410	629,168	28.1
Frontenac	29,902	702,697	23.5	33,104	923,602	27.9	27,656	779,183	28.2
Leeds and Grenville	72,221	1,661,083	23.0	76,443	2,232,136	29.2	65,756	2,059,724	31.3
Dundas	29,823	754,522	25.3	33,947	977,674	28.8	29,551	1,035,376	35.0
Stormont	22,342	625,576	28.0	24,727	712,138	28.8	24,137	827,565	34.3
Glengarry	30,480	697,992	22.9	31,651	870,403	27.5	30,168	951,253	31.5
Prescott	31,013	790,832	25.5	28,427	770,372	27.1	26,446	814,043	30.8
Russell	22.417	656,818	29.3	18,900	553,770	29.3	18,495	589,586	31 9
Carleton	63,724	1,816,134	28.5	70,851	2,160,956	30.5	60,231	2,077,789	34.5
Renfrew	43,262	1,163,748	26.9	50,287	1,971,250	39.2	40,800	1,295,443	31.8
Lanark	41,012	1,099,122	26.8	44,446	1,257,822	28.3	37,111	1,139,396	30.7
Totals	411,408	10,530,752	25.6	437,487	13,171,243	30.1	382,761	12,198,526	31.9
Victoria	42,032	1,269,366	30.2	48,058	1,691,642	35.2	38,855	1,289,503	33.2
Peterborough	31,797	880,777	27.7	36,528	1,220,035	33.4	29,932	935,178	31.2
Haliburton	5,777	155,979	27.0	6,822	216,940	31.8	5,127	140,970	27.5
Hastings	43,330	1,122,247	25.9	47,662	1,601,443	33.6	41,953	1,233,800	29.4
Totals	122,936	3,428,369	27.9	139,070	4,730,060	34.0	115,867	3,599,451	31.1
Muskoka	10,558	280,843	26.6	11,414	342,420	30.0	8,899	257,320	28.9
Parry Sound	7,569	196,037	25.9	6,036	164.179	27.2	4,929	148,888	30.2
Nipissing	1,668	49,039	29.1	....	....	......	185	5,449	29.4
Algoma	6,944	190,960	27.5	6,407	228,730	35.7	4,549	162,535	35.7
Totals	26,739	716,879	26.8	23,857	735,329	30.8	18,562	574,192	30.9
The Province	1,882,366	52,768,207	28.0	1,923.444	64,346,301	33.5	1,643.490	56,566,276	34.4

AREA AND PRODUCE—RYE.

TABLE XII. Showing by County Municipalities and groups of Counties the area and produce of Rye in Ontario for the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	873	14,841	17.0	845	15,844	18.8	804	16,305	20.3
Kent	1,484	32,203	21.7	806	17,732	22.0	737	15,858	21.5
Elgin	1,116	18,972	17.0	1,834	35,396	19.3	1,313	23,675	18.0
Norfolk	9,714	124,339	12.8	8,539	76,851	9.0	7,730	106,187	13.7
Haldimand	564	7,896	14.0	477	4,675	9.8	809	13,087	16.2
Welland	243	3,645	15.0	641	10,641	16.6	618	10,602	17.2
Totals	13,994	201,896	14.4	13,142	161,139	12.3	12,011	185,714	15.5
Lambton	462	8,778	19.0	312	5,538	17.8	249	4,243	17.0
Huron	306	4,590	15.0	232	3,480	15.0	270	4,650	17.2
Bruce	964	19,280	20.0	437	8,740	20.0	460	8,404	18.3
Totals	1,732	32,648	18.8	981	17,758	18.1	979	17,297	17.7
Grey	1,031	14,125	13.7	403	8,181	20.3	574	9,956	17.3
Simcoe	3,038	47,697	15.7	2,500	44,000	17.6	2,373	42,646	18.0
Totals	4,069	61,822	15.2	2,903	52,181	18.0	2,947	52,602	17.8
Middlesex	892	15,342	17.2	553	9,290	16.8	519	8,955	17.2
Oxford	1,502	24,032	16.0	1,539	26,625	17.3	1,238	19,272	15.6
Brant	1,621	27,395	16.9	1,596	18,354	11.5	1,096	16,427	15.0
Perth	79	1,185	15.0	44	880	20.0	190	2,807	14.8
Wellington	622	10,574	17.0	935	15,147	16.2	822	14,647	17.8
Waterloo	576	10,080	17.5	453	4,892	10.8	534	9,219	17.3
Dufferin	357	5,177	14.5	329	3,455	10.5	711	12,616	17.7
Totals	5,649	93,785	16.6	5,449	78,643	14.4	5,110	83,943	16.4
Lincoln	606	7,757	12.8	139	2,349	16.9	433	6,641	15.3
Wentworth	965	14,475	15.0	1,186	17,078	14.4	980	16,602	16.9
Halton	877	11,664	13.3	415	8,300	20.0	528	8,679	16.4
Peel	586	9,786	16.7	955	14,325	15.0	1,278	25,065	19.6
York	1,089	20,691	19.0	1,326	27,846	21.0	1,671	27,884	16.7
Ontario	1,548	22,291	14.4	1,776	29,837	16.8	2,648	46,341	17.5
Durham	3,908	55,103	14.1	3,917	65,414	16.7	4,851	73,804	15.2
Northumberland	12,365	155,799	12.6	10,795	137,097	12.7	11,425	153,409	13.4
Prince Edward	6,329	88,606	14.0	10,039	156,608	15.6	8,908	124,613	14.0
Totals	28,273	386,172	13.7	30,548	458,854	15.0	32,722	483,038	14.8
Lennox and Addington	3,450	49,680	14.4	4,103	61,955	15.1	4,940	73,181	14.8
Frontenac	3,391	48,491	14.3	3,229	54,570	16.9	3,691	60,508	16.4
Leeds and Grenville	4,153	57,727	13.9	1,780	31,862	17.9	5,999	104,144	17.4
Dundas	486	10,400	21.4	897	17,940	20.0	1,322	29,833	22.6
Stormont	332	5,810	17.5	240	4,200	17.5	455	9,349	20.5
Glengarry	201	3,015	15.0	....	....	......	68	1,136	16.7
Prescott	54	783	14.5	183	3,349	18.3	253	4,657	18.4
Russell	471	9,891	21.0	12	236	19.7	234	4,656	19.9
Carleton	4,558	82,500	18.1	3,808	81,110	21.3	5,957	107,864	18.1
Renfrew	9,126	156,055	17.1	5,312	126,957	23.9	6,773	131,781	19.5
Lanark	3,354	50,981	15.2	2,508	43,639	17.4	4,532	84,378	18.6
Totals	29,576	475,333	16.1	22.072	425,818	19.3	34,224	611,487	17.9
Victoria	1,819	31,651	17.4	1,240	24,056	19.4	1,232	21,199	17.2
Peterborough	6,116	86,236	14.1	2,295	27,999	12.2	3,462	53,314	15.4
Haliburton	410	6,683	16.3	141	2,637	18.7	266	4,464	16.8
Hastings	10,513	170,311	16.2	10,398	165,328	15.9	13,721	213,046	15.5
Totals	18,858	294,881	15.6	14,074	220,020	15.6	18,681	292,023	15.6
Muskoka	367	6,166	16.8	290	4,437	15.3	386	7.287	18.9
Parry Sound	154	3,711	24.1	141	3,215	22.8	322	6,765	21.0
Nipissing	82	1,558	19.0	....	....	......	9	173	19.0
Algoma	307	5,373	17.5	506	9,614	19.0	219	3,835	17.5
Totals	910	16,808	18.5	937	17,266	18.4	936	18,060	19.3
The Province	103,061	1,563,345	15.2	90,106	1,431,679	15.9	107,610	1,744,164	16.2

AREA AND PRODUCE—PEASE.

TABLE XIII. Showing by County Municipalities and groups of Counties the area and produce of Pease in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90: also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	4,179	73,968	17.7	3,665	59,373	16.2	3,872	72,098	18.6
Kent	12,771	192,842	15.1	14,847	246,460	16.6	10,747	204,897	19.1
Elgin	19,030	249,293	13.1	15,055	230,342	15.3	13,014	232,766	17.9
Norfolk	23,842	381,472	16.0	18,808	376,160	20.0	15,804	301,239	19.1
Haldimand	18,316	289,393	15.8	14,981	247,187	16.5	13,766	252,254	18.3
Welland	6,058	75,725	12.5	4,481	84,243	18.8	4,259	71,763	16.8
Totals	84,196	1,262,693	15.0	71,837	1,243,765	17.3	61,462	1,135,017	18.5
Lambton	15,844	240,829	15.2	12,009	180,135	15.0	10,082	186,297	18.5
Huron	45,558	920,272	20.2	36,290	718,542	19.8	33,043	728,485	22.0
Bruce	43,548	1,062,571	24.4	40,353	730,389	18.1	37,641	848,547	22.5
Totals	104,950	2,223,672	21.2	88,652	1,629,066	18.4	80,766	1,763,329	21.8
Grey	48,563	1,058,673	21.8	51,523	1,143,811	22.2	45,977	984,611	21.4
Simcoe	37,511	810,238	21.6	34,542	746,107	21.6	32,044	683,745	21.3
Totals	86,074	1,868,911	21.7	86,065	1,889,918	22.0	78,021	1,668,356	21.4
Middlesex	29,829	486,213	16.3	28,773	417,209	14.5	22,739	432,041	19.0
Oxford	20,656	324,299	15.7	18,841	265,658	14.1	15,850	328,759	20.7
Brant	12,329	245,347	19.9	9,728	230,554	23.7	9,180	184,230	20.1
Perth	29,357	575,397	19.6	28,165	422,475	15.0	23,538	521,762	22.2
Wellington	43,377	915,255	21.1	39,591	779,943	19.7	37,776	846,382	22.4
Waterloo	19,999	415,979	20.8	16,237	298,761	18.4	14,784	326,695	22.1
Dufferin	15,354	322,434	21.0	13,336	282,723	21.2	11,961	250,027	20.9
Totals	170,901	3,284,924	19.2	154,671	2,697,323	17.4	135,828	2,889,896	21.3
Lincoln	7,701	120,136	15.6	5,255	89,861	17.1	4,968	88,944	17.9
Wentworth	14,046	276,706	19.7	13,181	222,759	16.9	10,933	220,469	20.2
Halton	13,729	270,461	19.7	10,297	205,940	20.0	10,633	225,090	21.2
Peel	20,465	425,672	20.8	15,946	279,055	17.5	14,257	292,727	20.5
York	36,074	771,984	21.4	32,240	648,024	20.1	28,706	634,088	22.1
Ontario	27,973	475,541	17.0	28,164	518,218	18.4	26,646	543,053	20.4
Durham	22,130	371,784	16.8	19,989	335,815	16.8	21,496	409,839	19.1
Northumberland	20,191	411,896	20.4	19,056	388,742	20.4	20,157	344,193	17.1
Prince Edward	18,907	414,063	21.9	18,630	340,929	18.3	13,482	238,989	17.7
Totals	181,216	3,538,243	19.5	162,758	3,029,343	18.6	151,278	2,997,392	19.8
Lennox and Addington	9,861	182,429	18.5	8,805	175,220	19.9	8,825	160,682	18.2
Frontenac	10,294	181,174	17.6	9,048	135,720	15.0	10,877	190,740	17.5
Leeds and Grenville	5,493	95,029	17.3	6,388	101,569	15.9	6,276	117,288	18.7
Dundas	1,262	31,298	24.8	1,526	18,770	12.3	1,672	35,759	21.4
Stormont	1,637	35,359	21.6	2,110	18,990	9.0	2,516	50,439	20.0
Glengarry	3,981	72,454	18.2	3,920	47,040	12.0	5,682	101,309	17.8
Prescott	6,396	111,930	17.5	4,306	53,394	12.4	8,604	138,436	16.1
Russell	4,039	76,741	19.0	1,869	28,035	15.0	3,739	72,113	19.3
Carleton	10,011	228,251	22.8	12,047	273,467	22.7	12,757	271,759	21.3
Renfrew	21,276	472,327	22.2	20,695	564,974	27.3	20,632	421,369	20.6
Lanark	11,346	230,324	20.3	11,712	260,006	22.2	11,369	239,822	21.1
Totals	85,596	1,717,316	20.1	82,426	1,677,185	20.3	92,949	1,802,716	19.4
Victoria	17,117	379,997	22.2	15,576	353,575	22.7	16,009	327,488	20.5
Peterborough	16,143	356,760	22.1	14,759	318,794	21.6	15,093	287,642	19.1
Haliburton	2,097	39,843	19.0	1,507	29,839	19.8	1,595	30,194	18.9
Hastings	20,707	447,271	21.6	20,225	420,680	20.8	18,510	328,475	17.7
Totals	56,064	1,223,871	21.8	52,067	1,122,888	21.6	51,207	973,799	19.0
Muskoka	3,756	83,008	22.1	2,910	61,401	21.1	2,803	58,025	20.7
Parry Sound	2,512	49,989	19.9	1,508	27,446	18.2	1,453	30,407	20.9
Nipissing	696	14,477	20.8	....	....	.....	77	1,608	20.8
Algoma	5,245	122,209	23.3	5,174	130,902	25.3	3,841	97,579	25.4
Totals	12,209	269,683	22.1	9,592	219,749	22.9	8,174	187,619	23.0
The Province	781,206	15,389,313	19.7	708,068	13,509,237	19.1	659,685	13,418,124	20.3

AREA AND PRODUCE—CORN.

TABLE XIV. Showing by County Municipalities and groups of Counties the area and produce of Corn in Ontario in the years 1889 and 1890, with the yearly average for the eight years 1882-90 (1883 not included); also the yield per acre.

Counties.	1890.			1889.			Yearly average for the eight years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	38,436	2,863,482	74.5	27,893	1,107,352	39.7	31,612	2,306,093	72.9
Kent	27,596	2,011,748	72.9	23,717	1,100,469	46.4	25,927	1,820,160	70.2
Elgin	13,313	812,093	61.0	12,503	642,654	51.4	14,300	1,019,321	71.3
Norfolk	13,027	648,745	49.8	12,884	663,526	51.5	13.905	871,013	62.6
Haldimand	1,916	91,585	47.8	2,582	125,227	48.5	1,949	125,613	64.4
Welland	5,626	268,360	47.7	5,705	260,148	45.6	6,155	374,508	60.8
Totals	99,914	6,696,013	67.0	85,284	3,899,376	45.7	93,848	6,516,708	69.4
Lambton	9,220	566,108	61.4	6,936	255,938	36.9	7,417	445,448	60.1
Huron	2,538	148,727	58.6	1,890	94,500	50.0	1,685	114,228	67.8
Bruce	1,832	78,776	43.0	1,051	52,550	50.0	729	37,796	51.8
Totals	13,590	793,611	58.4	9,877	402,988	40.8	9,831	597,472	60.8
Grey	2,004	100,200	50.0	962	36,556	38.0	677	32,743	48.4
Simcoe	1,342	81,862	61.0	1,041	59,858	57.5	862	48,907	56.7
Totals	3,346	182,062	54.4	2,003	96,414	48.1	1,539	81,650	53.1
Middlesex	12,935	811,025	62.7	10,815	509,387	47.1	10,977	727,444	66.3
Oxford	10,775	633,570	58.8	8,557	365,384	42.7	8,760	537,837	61.4
Brant	4,938	357,017	72.3	5,310	318,600	60.0	4,784	329,434	68.9
Perth	1,671	91,905	55.0	952	33,320	35.0	844	51,988	61.6
Wellington	1,551	93,060	60.0	829	41,450	50.0	695	40,941	58.9
Waterloo	1,494	94,570	63.3	1,074	64,440	60.0	1,284	83,015	64.7
Dufferin	226	11,300	50.0	120	6,000	50.0	92	4,768	51.8
Totals	33,590	2,092,447	62.3	27,657	1,338,581	48.4	27,436	1,775,427	64.7
Lincoln	5,970	257,307	43.1	6,562	297,259	45.3	6,247	387,316	62.0
Wentworth	5,214	333,696	64.0	4,380	268,932	61.4	4,504	323,004	71.7
Halton	1,803	129,275	71.7	1,660	99,600	60.0	1,241	76,632	61.8
Peel	1,121	67,260	60.0	1,038	84,078	81.0	601	37,062	61.7
York	2,727	163,620	60.0	1,797	105,664	58.8	1,559	100,245	64.3
Ontario	3,198	170,453	53.3	3,263	154,993	47.5	2,653	153,139	57.7
Durham	2,191	113,275	51.7	2,158	135,954	63.0	1,901	98,749	51.9
Northumberland	5,128	265,118	51.7	4,869	258,057	53.0	4,074	215,480	52.9
Prince Edward	7,340	448,474	61.1	6,115	328,987	53.8	5,999	298,064	49.7
Totals	34,692	1,948,478	56.2	31,842	1,733,524	54.4	28,779	1,689,691	58.7
Lennox and Addington	2,706	150,183	55.5	2,660	187,530	70.5	2,329	125,161	53.7
Frontenac	2,459	135,245	55.0	2,045	104,500	51.1	1,805	93,941	52.0
Leeds and Grenville	9,442	626,949	66.4	7,028	499,691	71.1	5,895	375,457	63.7
Dundas	2,233	131,524	58.9	2,261	104,006	46.0	1,729	108,732	62.9
Stormont	1,689	126,675	75.0	1,152	69,811	60.6	1,289	75,425	58.5
Glengarry	2,047	151,069	73.8	806	52,390	65.0	885	47,989	54.2
Prescott	1,268	95,354	75.2	1,279	78,147	61.1	1,312	72,981	55.6
Russell	752	43,842	58.3	433	19,485	45.0	453	21,360	47.2
Carleton	3,350	169,175	50.5	1,914	102,590	53.6	1,598	78,672	49.2
Renfrew	790	35,550	45.0	454	22,337	49.2	490	24,706	50.4
Lanark	2,028	126,750	62.5	1,647	86,468	52.5	1,410	70,163	49.8
Totals	28,764	1,792,316	62.3	21,679	1,326,955	61.2	19,195	1,094,587	57.0
Victoria	726	43,560	60.0	930	62,775	67.5	584	37,775	64.7
Peterborough	758	39,795	52.5	423	19,035	45.0	408	19,737	48.4
Haliburton	147	5,880	40.0	68	4,760	70.0	112	5,454	48.7
Hastings	7,918	402,234	50.8	6,983	347,055	49.7	5,875	293,896	50.0
Totals	9,549	491,469	51.5	8,404	433,625	51.6	6,979	356,862	51.1
Muskoka	234	8,564	36.6	200	10,000	50.0	208	7,949	38.2
Parry Sound	56	2,240	40.0	32	1,216	38.0	36	1,557	43.3
Nipissing	35	1,341	38.3	....	....	......	4	168	38.3
Algoma	66	2,640	40.0	138	5,520	40.0	77	3.450	44.8
Totals	391	14,785	37.8	370	16,736	45.2	325	13,124	40.4
The Province	223,836	14,011,181	62.6	187,116	9,248,199	49.4	187,932	12,125,521	64.5

AREA AND PRODUCE–BUCKWHEAT.

TABLE XV. Showing by County Municipalities and groups of Counties the area and produce of Buckwheat in Ontario in the years 1889 and 1890, with the yearly average for the eight years 1882-90 (1883 not included); also the yield per acre.

Counties.	1890.			1889.			Yearly average for the eight years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	934	17,092	18.3	659	9,556	14.5	639	14,773	23.1
Kent	1,361	29,534	21.7	724	11,222	15.5	886	19,132	21.6
Elgin	2,051	43,891	21.4	1,105	26,520	24.0	1,329	27,820	20.9
Norfolk	5,402	113,442	21.0	3,791	71,650	18.9	4,699	93,095	19.8
Haldimand	427	9,736	22.8	872	17,091	19.6	717	13,607	19.0
Welland	1,854	39,676	21.4	1,622	28,061	17.3	1,736	33,624	19.4
Totals	12,029	253,371	21.1	8,773	164,100	18.7	10,006	202,051	20.2
Lambton	1,103	17,097	15.5	350	5,880	16.8	483	9,612	19.9
Huron	456	9,120	20.0	136	2,448	18.0	265	4,994	18.8
Bruce	860	12,040	14.0	234	4,680	20.0	382	6,450	16.9
Totals	2,419	38,257	15.8	720	13,008	18.1	1,130	21,056	18.6
Grey	603	11,276	18.7	247	3,458	14.0	353	6,293	17.8
Simcoe	919	16,818	18.3	217	4,123	19.0	393	6,669	17.0
Totals	1,522	28,094	18.5	464	7,581	16.3	746	12,962	17.4
Middlesex	376	7,595	20.2	485	8,730	18.0	530	9,560	18.0
Oxford	933	15,861	17.0	461	8,436	18.3	638	12,110	19.0
Brant	790	15,326	19.4	495	9,257	18.7	670	13,411	20.0
Perth	86	2,150	25.0	63	1,285	20.4	108	2,252	20.9
Wellington	582	14,550	25.0	121	3,025	25.0	184	4,361	23.7
Waterloo	144	2,880	20.0	46	552	12.0	94	1,893	20.1
Dufferin	79	1,580	20.0	72	1,188	16.5	98	1,903	19.4
Totals	2,990	59,942	20.0	1,743	32,473	18.6	2,322	45,490	19.6
Lincoln	846	19,458	23.0	527	9,697	18.4	671	15,940	23.8
Wentworth	1,331	26,487	19,9	582	8,963	15.4	757	16,374	21.6
Halton	65	1,300	20.0	220	3,476	15.8	163	2,606	16.0
Peel	148	3,700	25.0	381	6,706	17.6	248	4,497	18.1
York	182	2,548	14.0	196	3,920	20.0	253	5,305	21.0
Ontario	1,238	26,369	21.3	474	14,220	30.0	505	11,827	23.4
Durham	3,995	86,692	21.7	1,874	40,104	21.4	1,554	33,618	21.6
Northumberland	11,038	231,798	21.0	6,679	140,927	21.1	6,083	127,941	21.0
Prince Edward	8,437	207,550	24.6	6,681	116,918	17.5	6,810	155,750	22.9
Totals	27,280	605,902	22.2	17,614	344,931	19.6	17,044	373,858	21.9
Lennox and Addington	5,672	145,770	25.7	2,035	67,969	33.4	2,950	74,303	25.2
Frontenac	2,099	55,414	26.4	1,251	34,903	27.9	1,568	38,193	24.4
Leeds and Grenville	7,078	174,827	24.7	5,156	124,260	24.1	5,471	126,266	23.1
Dundas	2,420	74,294	30.7	1,506	38,704	25.7	1,585	43,927	27.7
Stormont	2,346	66,392	28.3	1,434	37,141	25.9	2,013	53,718	26.7
Glengarry	1,580	35,392	22.4	1,196	26,910	22.5	1,070	25,576	23.9
Prescott	1,762	33,830	19.2	1,022	27,696	27.1	1,532	32,965	21.5
Russell	1,373	35,149	25.6	616	18,911	30.7	966	23,365	24.2
Carleton	2,850	63,840	22.4	3,443	109,487	31.8	3,683	81,188	22.0
Renfrew	1,391	32,132	23.1	720	15,120	21.0	1,102	25,032	22.7
Lanark	4,917	108,666	22 1	3,770	95,758	25.4	5,390	125,079	23.2
Totals	33,488	825,706	24.7	22,149	596,859	26.9	27,330	649,612	23.8
Victoria	1,897	43,062	22.7	478	14,149	29.6	602	11,868	19.7
Peterborough	1,947	50,817	26.1	461	12,032	26.1	827	18,526	22.4
Haliburton	340	8,772	25.8	173	3.633	21.0	242	4,104	17.0
Hastings	5,218	116,361	22.3	3,457	75,017	21.7	3,828	89,210	23.3
Totals	9,402	219,012	23.3	4,569	104,831	22.9	5,499	123,708	22.5
Muskoka	548	12,549	22.9	269	6,725	25.0	318	8,266	26.0
Parry Sound	198	5,702	28.8	13	390	30.0	101	2,520	25.0
Nipissing	85	2,185	25.7	....	....	......	11	273	25.7
Algoma	150	3,000	20.0	84	1,680	20.0	70	1,562	22.3
Totals	981	23,436	23.9	366	8,795	24.0	500	12,621	25.2
The Province	90,111	2,053,720	22.8	56,398	1,272,578	22.6	64,577	1,441,358	22.3

AREA AND PRODUCE—BEANS.

TABLE XVI. Showing by County Municipalities and groups of Counties the area and produce of Beans in Ontario in the years 1889 and 1890, with the yearly average for the eight years 1882-90 (1883 not included); also the yield per acre.

Counties.	1890.			1889.			Yearly average for the eight years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	887	18,893	21.3	412	7,004	17.0	499	11,677	23.4
Kent	24,981	492,126	19.7	12,842	191,346	14.9	13,377	257,785	19.3
Elgin	2,599	49,901	19.2	890	18,868	21.2	1,223	26,044	21.3
Norfolk	378	6,124	16.2	234	5,850	25.0	540	10,242	19.0
Haldimand	323	4,942	15.3	208	2.870	13.8	173	3,223	18.6
Welland	1,155	13,860	12.0	483	6,424	13.3	710	10,738	15.1
Totals	30,323	585,846	19.3	15,069	232,362	15.4	16,522	319,709	19.4
Lambton	468	5,803	12.4	263	4,077	15.5	356	6,689	18.8
Huron	111	2,775	25.0	133	2,660	20.0	115	3,047	26.5
Bruce	150	2,700	18.0	77	1,925	25.0	106	2,047	19.3
Totals	729	11,278	15.5	473	8,662	18.3	577	11,783	20.4
Grey	351	7,020	20.0	79	1,580	20.0	135	2,391	17.7
Simcoe	78	1,404	18.0	136	2,720	20.0	105	2,035	19.4
Totals	429	8,424	19.6	215	4,300	20.0	240	4,426	18.4
Middlesex	322	6,118	19.0	271	4,770	17.6	312	5,972	19.1
Oxford	188	3,102	16.5	224	4,480	20.0	217	5,715	26.3
Brant	269	5,003	18.6	42	685	16.3	394	7,155	18.2
Perth	10	250	25.0	59	1,440	24.4	54	1,330	24.6
Wellington	39	780	20.0	49	980	20.0	38	733	19.3
Waterloo	61	1,220	20 0	29	522	18.0	37	767	20.7
Dufferin	28	560	20.0	21	420	20.0	19	411	21.6
Totals	917	17,033	18.6	695	13,297	19.1	1,071	22,083	20.6
Lincoln	262	5,240	20.0	160	3,040	19.0	166	3,469	20.9
Wentworth	541	8,927	16.5	94	,115	22.5	173	3,392	19.6
Halton	17	298	17.5	42	840	20.0	39	754	19.3
Peel	24	420	17.5	49	1,225	25.0	54	1,329	24.6
York	79	1,975	25.0	136	2,584	19.0	129	3,378	26.2
Ontario	244	4,221	17.3	90	1,575	17.5	238	5,289	22.2
Durham	392	7,174	18.3	287	3,918	13.7	316	6.147	19.5
Northumberland	594	9,623	16.2	487	8,425	17.3	513	10,814	21.1
Prince Edward	377	6,861	18.2	396	8,910	22.5	456	9,499	20.8
Totals	2,530	44,739	17.7	1,741	32,632	18.7	2,084	44,071	21.1
Lennox and Addington	239	5,091	21.3	79	2,275	28.8	164	3,255	19.8
Frontenac	136	2,530	18.6	237	4,930	20.8	288	7,441	25.8
Leeds and Grenville	565	11,583	20.5	325	5,590	17.2	385	8,337	21.7
Dundas	228	5,700	25.0	406	11,043	27.2	254	6,185	24.4
Stormont	194	4,171	21.5	268	6.030	22.5	180	4,456	24.8
Glengarry	232	4,640	20.0	66	1,485	22.5	103	2,612	25.4
Prescott	365	6,388	17.5	496	10,218	20.6	481	12,849	26.7
Russell	197	3,546	18.0	97	1,843	19.0	199	4,379	22.0
Carleton	600	13,800	23.0	395	8,888	22.5	463	10,328	22.3
Renfrew	626	12,395	19.8	425	12,368	29.1	470	11,058	23.5
Lanark	278	5,365	19.3	205	5,986	29.2	220	5,281	24.0
Totals	3,660	75,209	20.5	2,999	70,656	23.6	3,207	76,181	23.8
Victoria	122	2,843	23.3	61	1,220	20.0	85	1,695	19.9
Peterborough	282	5,640	20.0	46	690	15.0	142	2,338	16.5
Haliburton	26	520	20.0	22	550	25.0	25	493	19.7
Hastings	327	7,488	22.9	404	5,454	13.5	304	6,222	20.5
Totals	757	16,491	21.8	533	7,914	14.8	556	10,748	19.3
Muskoka	37	833	22.5	59	1,180	20.0	42	875	20.8
Parry Sound	41	820	20.0	10	170	17.0	16	339	21.2
Nipissing	11	228	20.7	....	....	...	1	29	20.7
Algoma	22	440	20.0	36	720	20.0	15	297	19.8
Totals	111	2,321	20.9	105	2,070	19.7	74	1,540	20.8
The Province	39.456	761,341	19.3	21,830	371,893	17.0	24,331	490,541	20.2

AREA AND PRODUCE—HAY AND CLOVER.

TABLE XVII. Showing by County Municipalities and groups of Counties the area and produce of Hay and Clover in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.	Acres.	Tons.	Tons per acre.
Essex	39.980	69,565	1.74	40,911	76,913	1.88	36,366	58,200	1.60
Kent	53,422	105,776	1.98	56,631	102,502	1.81	51,379	80,625	1.57
Elgin	54,527	104,147	1.91	53,624	106,176	1.98	49,790	77,099	1.55
Norfolk	42,532	72,730	1.71	40,804	67,735	1.66	40,417	55,873	1.38
Haldimand	48,325	81,669	1.69	50,579	70,811	1.40	49,229	65,762	1.34
Welland	47,790	91,757	1.92	54,047	84,313	1.56	46,851	65,464	1.40
Totals	286,576	525,644	1.83	296,596	508,450	1.71	274,032	403,023	1.47
Lambton	59,278	105,515	1.78	58,919	97,806	1.66	53,591	79,976	1.49
Huron	110,221	209,420	1.90	103,376	165,402	1.60	95,212	138,793	1.46
Bruce	101,149	169,930	1.68	94,852	136,587	1.44	84,391	111,492	1.32
Totals	270,648	484,865	1.79	257,147	399,795	1.55	233,194	330,261	1.42
Grey	126,129	239,645	1.90	126,244	181,791	1.44	115,454	147,833	1.28
Simcoe	83,666	135,957	1.63	85,031	127,547	1.50	76,043	103,638	1.36
Totals	209,795	375,602	1.79	211,275	309,338	1.46	191,497	251,471	1.31
Middlesex	93,878	189.634	2.02	94,609	164,620	1.74	89,168	139,721	1.57
Oxford	66,180	144,272	2.18	62,222	106.400	1.71	62,086	97,995	1.58
Brant	32,782	75,071	2.29	29,601	52,394	1 77	31,685	47,918	1.51
Perth	72,403	159,287	2.20	69,277	110,843	1.60	67,084	106,107	1.58
Wellington	90,500	181,000	2.00	86,251	131,102	1.52	82,738	128,609	1.55
Waterloo	43,690	85,632	1.96	40,874	62,537	1.53	42,327	67,297	1.59
Dufferin	34,205	62,595	1.83	36,528	54,061	1.48	33,183	45,334	1.37
Totals	433,638	897,491	2.07	419,362	681,957	1.63	408,271	632,981	1.55
Lincoln	38,797	77,594	2.00	42,595	65,170	1.53	40,788	56,289	1.38
Wentworth	41,830	94,954	2.27	44,837	74,878	1.67	44,484	67,198	1.51
Halton	30,525	53,419	1.75	32,725	50,397	1.54	33,256	46,537	1.40
Peel	35,884	66,385	1.85	38,048	58,213	1.53	37,353	55,043	1.47
York	71,658	126,835	1.77	70,636	111,605	1.58	71,355	101,501	1.42
Ontario	59,897	106,617	1.78	52,742	85,969	1.63	52,762	76,958	1.46
Durham	46,882	89,545	1.91	40,664	68,316	1.68	43,353	62,971	1.45
Northumberland	58,566	92,534	1.58	53,635	82,062	1.53	53,212	69,638	1.31
Prince Edward	33,602	53,091	1.58	28,755	52,622	1.83	29,634	40,602	1.37
Totals	417,641	760,974	1.82	404,637	649,232	1.60	406,197	576,737	1.42
Lennox and Addington	63,769	95,654	1.50	54,238	78,103	1.44	48,407	59,910	1.24
Frontenac	65,478	110,003	1.68	65,369	101,976	1.56	61,819	76,304	1.23
Leeds and Grenville	119,216	180,016	1.51	115,716	192,088	1.66	110,492	148.308	1.34
Dundas	40,071	60,107	1.50	38,294	65,866	1.72	35,018	54,682	1 56
Stormont	37,332	51,518	1.38	36,585	68,048	1.86	32,372	50,150	1.55
Glengarry	40,757	54,343	1.33	44,309	85,073	1.92	36,262	58,905	1.62
Prescott	43,525	63,982	1.47	35,575	54,786	1.54	32,453	46,824	1.44
Russell	20,835	28,127	1.35	16,879	23,631	1.40	17,883	23,869	1.33
Carleton	65,046	83,909	1.29	58,654	76,837	1.31	58,492	78,324	1.34
Renfrew	63,443	84,591	1.33	67,431	78,894	1.17	61,868	68,172	1.10
Lanark	58,962	83,726	1.42	62,619	93,302	1.49	59,134	81,721	1.38
Totals	618,434	895,976	1.45	595,669	918,604	1.54	554,200	747,169	1.35
Victoria	42,687	61,042	1.43	37,812	50,290	1.33	37,746	45,446	1.20
Peterborough	40,151	65,446	1.63	36,941	49,870	1.35	37,830	44,595	1.18
Haliburton	10,196	11,895	1.17	10,645	10,432	.98	9,929	10,514	1.06
Hastings	75,547	129,185	1.71	71,733	96,122	1.34	67,583	87,733	1.30
Totals	168,581	267,568	1.59	157,131	206,714	1.32	153,088	188,288	1.23
Muskoka	22,417	41,471	1.85	22,018	24,220	1.10	20,630	25,796	1.25
Parry Sound	14,580	21,870	1.50	10,587	13,128	1.24	9,695	11,183	1.15
Nipissing	4,703	8,223	1.75	....	....	.....	523	914	1.75
Algoma	14,989	26,231	1.75	11,801	16,875	1.43	10,337	13,791	1.33
Totals	56,689	97,795	1.73	44,406	54,223	1.22	41,185	51,684	1.25
The Province	2,462,002	4,305,915	1.75	2,386,223	3,728,313	1.56	2,261,664	3,181,614	1.40

AREA AND PRODUCE—POTATOES.

TABLE XVIII. Showing by County Municipalities and groups of Counties the area and produce of Potatoes in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	2.600	206,440	79.4	2,470	130,910	53.0	2,769	284,049	102.6
Kent	3,013	290,755	96.5	2,588	207,040	80.0	3,302	412,520	124.9
Elgin	2,646	222,793	84.2	2,225	151,968	68.3	2,812	281,306	100.0
Norfolk	2,807	200,701	71.5	2,749	145,422	52.9	3,369	340,115	101.0
Haldimand	1,320	92,928	70.4	1,309	76,184	58.2	1,480	160,727	108.6
Welland	2,254	143,129	63.5	1,954	125,447	64.2	2,366	221,435	93.6
Totals	14,640	1,156,746	79.0	13,295	836,971	63.0	16,098	1,700,152	105.6
Lambton	3,130	254,156	81.2	2,425	136,285	56.2	2,975	300,792	101.1
Huron	4,943	538.274	118.0	4,631	470,973	101.7	5,062	606,804	119.9
Bruce	4,633	529,089	114.2	4,366	441,403	101.1	4,745	544,206	114.7
Totals	12,706	1,321,519	104.0	11,422	1,048,661	91.8	12,782	1,451,802	113.6
Grey	6,815	1,089,037	159.8	6,304	650,573	103.2	6,881	877,791	127.6
Simcoe	7,396	982,928	132.9	6,670	747,040	112.0	6,806	869,693	127.8
Totals	14,211	2,071,965	145.8	12,974	1,397,613	107.7	13,687	1,747,484	127.7
Middlesex	6,078	577,410	95.0	4,400	259,600	59.0	5,607	586,892	104.7
Oxford	3,149	284,355	90.3	2,830	208,854	73.8	3,274	354,850	108.4
Brant	2,173	236,857	109.0	2,150	161,250	75.0	2,215	244,482	110.4
Perth	3,403	439,668	129.2	3,146	184,356	58.6	3,720	421,561	113.3
Wellington	6,203	825,619	133.1	5,403	613,781	113.6	5,904	722,078	122.3
Waterloo	2,896	351,285	121.3	2,641	218,411	82.7	2,898	349,900	120.7
Dufferin	3,919	540,038	137.8	2,658	311,783	117.3	3,128	439,378	140.5
Totals	27,821	3,255,232	117.0	23,228	1,958,035	84.3	26,746	3,119,141	116.6
Lincoln	1,747	140,109	80.2	1,605	100,313	62.5	1,905	184,860	97.0
Wentworth	4,219	391,945	92.9	3,007	236,050	78.5	3,571	416,744	116.7
Halton	1,532	146,766	95.8	1,384	123,591	89.3	1,599	179,247	112.1
Peel	3,218	276,104	85.8	2,974	235,541	79.2	2,915	305,811	104.9
York	8,244	867,269	105.2	7,387	785,238	106.3	7,624	799,036	104.8
Ontario	4,492	457,286	101.8	4,453	504,970	113.4	4,144	516,278	124.6
Durham	3,195	313,430	98.1	2,982	381,994	128.1	3,147	395,158	125.6
Northumberland	4,699	476,949	101.5	4,417	410,339	92.9	4,337	466,271	107.5
Prince Edward	2,324	181,737	78.2	2,336	150,906	64.6	2,414	223,078	92.4
Totals	33,670	3,251,595	96.6	30,545	2,928,942	95.9	31,656	3,486,483	110.1
Lennox and Addington	3,081	265,890	86.3	2,796	316,787	113.3	3,236	364,376	112.6
Frontenac	4,299	361,116	84.0	4,023	259,081	64.4	4,047	397,465	98.2
Leeds and Grenville	7,391	753,143	101.9	7,323	496,499	67.8	7,293	849,643	116.5
Dundas	2,216	365,640	165.0	2,341	166,913	71.3	2,417	341,925	141.5
Stormont	1,985	218,350	110.0	1,838	87,305	47.5	2,043	245,313	120.1
Glengarry	2,275	251,843	110.7	2,277	100,188	44.0	2,438	277,050	113.6
Prescott	2,195	358,005	163.1	2,309	221,664	96.0	2,377	311,556	131.1
Russell	1,434	176,382	123.0	1,401	128,472	91.7	1,495	153,818	102.9
Carleton	6,309	808,814	128.2	6,475	903,910	139.6	6,073	801,847	132.0
Renfrew	3,814	497,346	130.4	3,790	720,100	190.0	3,771	570,710	151.3
Lanark	3,336	421,337	126.3	3,365	469,418	139.5	3,547	498,007	140.4
Totals	38,335	4,477,866	116.8	37,938	3,870,337	102.0	38,737	4,811,710	124.2
Victoria	3,490	484,761	138.9	3,767	541,695	143.8	3,157	412,493	130.7
Peterborough	3,190	351,857	110.3	2,915	434,044	148.9	2,688	321,824	119.7
Haliburton	720	87,840	122.0	654	87,505	133.8	684	91,447	133.7
Hastings	5,311	517,823	97.5	5,889	717,869	121.9	5,781	685,359	118.6
Totals	12,711	1,442,281	113.5	13,225	1,781,113	134.7	12,310	1,511,123	122.8
Muskoka	1,395	176,886	126.8	1,545	253,844	164.3	1,354	184,311	136.1
Parry Sound	1,107	159,962	144.5	863	136,268	157.9	763	115,305	151.1
Nipissing	431	60,340	140.0	....	....	......	48	6.704	140.0
Algoma	1,067	186,725	175.0	777	143,745	185.0	738	127,001	172.1
Totals	4,000	583,913	146.0	3,185	533,857	167.6	2,903	433,321	149.3
The Province	158,094	17,561,117	111.1	145,812	14,355,529	98.5	154,919	18,261,216	117.9

AREA AND PRODUCE—MANGEL-WURZELS.

TABLE XIX. Showing by County Municipalities and groups of Counties the area and produce of Mangel-wurzels in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	219	128,334	586	186	29,388	158	196	79,456	405
Kent	471	220,428	468	324	96,228	297	300	121,319	404
Elgin	345	133,170	386	322	104,650	325	287	111,790	390
Norfolk	248	90,024	363	311	101,075	325	215	81,901	381
Haldimand	208	86,320	415	300	79,200	264	174	58,415	336
Welland	116	43,036	371	223	80,949	363	151	61,249	406
Totals	1,607	701,312	436	1,666	491,490	295	1,323	514,130	389
Lambton	445	194,465	437	512	125,440	245	394	152,889	388
Huron	2,155	1,038,710	482	1,742	698,542	401	1,552	697,853	450
Bruce	770	329,560	428	384	121,344	316	448	186,242	416
Totals	3,370	1,562,735	464	2,638	945,326	358	2,394	1,036,984	433
Grey	646	260,338	403	308	116,732	379	378	166,527	441
Simcoe	583	237,281	407	462	204,666	443	629	252,760	402
Totals	1,229	497,619	405	770	321.398	417	1,007	419,287	416
Middlesex	1,758	812,196	462	1,622	496,332	306	1,374	577,949	421
Oxford	1,652	751,660	455	1,608	541,896	337	1,259	576,917	458
Brant	404	204,828	507	361	108,300	300	355	174,837	492
Perth	2.862	1,419,552	496	1,929	590,274	306	1,678	792,920	473
Wellington	1,433	654,881	457	1,103	349,651	317	950	414,444	436
Waterloo	697	286,467	411	511	80,738	158	489	205,509	420
Dufferin	140	73,500	525	89	32,930	370	124	49,956	403
Totals	8,946	4,203,084	470	7,223	2,200,121	305	6,229	2,792,532	448
Lincoln	203	89,726	442	317	112,218	354	244	92,953	381
Wentworth	585	283,725	485	448	120,512	269	448	217,775	486
Halton	577	259,650	450	447	165,390	370	436	199,670	458
Peel	446	182,414	409	626	183,418	293	455	176,737	388
York	1,925	866,250	450	1,914	692,868	362	1,755	795,510	453
Ontario	988	529,568	536	758	326,698	431	784	353,582	451
Durham	711	284,400	400	467	219,490	470	477	203,208	426
Northumberland	491	225,860	460	486	195,372	402	458	195,364	427
Prince Edward	101	35,350	350	131	20,960	160	124	35,512	286
Totals	6,027	2,756,943	457	5,594	2,036,926	364	5,181	2,270,311	438
Lennox and Addington	108	40,500	375	128	43,520	340	132	44,316	336
Frontenac	87	27,057	311	327	96,138	294	179	62,616	350
Leeds and Grenville	237	87,216	368	315	128,205	407	223	92,666	416
Dundas	81	26,730	330	80	15,520	194	103	39,736	386
Stormont	60	18,000	300	14	4,438	317	32	11,844	370
Glengarry	89	30,082	338	60	22,500	375	67	20,998	313
Prescott	202	84,234	417	117	37,089	317	86	31,900	371
Russell	243	106,920	440	49	22,050	450	73	26,058	357
Carleton	1,073	391,645	365	449	161,191	359	576	210,713	366
Renfrew	109	34,553	317	85	42,925	505	104	36,277	349
Lanark	158	75,524	478	111	45,843	413	140	55,913	399
Totals	2,447	922,461	377	1,735	619,419	357	1,715	633,037	369
Victoria	757	355,790	470	731	313,599	429	543	253,988	468
Peterborough	443	178,086	402	303	116,655	385	305	111,068	364
Haliburton	12	3,900	325	4	1,044	261	7	2,312	330
Hastings	1,064	395,808	372	475	159,125	335	382	123,148	322
Totals	2,276	933,584	410	1,513	590,423	390	1,237	490,516	397
Muskoka	40	13,480	337	38	11,400	300	50	12,986	260
Parry Sound	5	1,500	300	7	1,575	225	10	2,090	209
Nipissing	1	300	300	....	....	......	0	33	300
Algoma	5	1,500	300	27	5,400	200	21	6,039	288
Totals	51	16,780	329	72	18,375	255	81	21,148	261
The Province	25,953	11,594,518	447	21,211	7,223,478	341	19,167	8,177,945	427

AREA AND PRODUCE—CARROTS.

TABLE XX. Showing by County Municipalities and groups of Counties the area and produce of Carrots in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90		
	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush per acre.	Acres.	Bushels.	Bush. per acre.
Essex	104	35,152	338	120	12,600	105	89	22,291	250
Kent	232	74,936	323	164	31,652	193	154	43,618	283
Elgin	222	79,254	357	174	52,722	303	155	47,515	307
Norfolk	276	68,724	249	192	48,000	250	151	41,824	277
Haldimand	87	27,753	319	128	31,232	244	88	23,079	262
Welland	61	13,237	217	104	27,872	268	80	22,395	280
Totals	982	299,056	305	882	204,078	231	717	200,722	280
Lambton	265	87,980	332	253	60,467	239	197	58,318	296
Huron	422	160,782	381	503	157,439	313	500	193,897	388
Bruce	361	122,379	339	291	68,094	234	306	99,196	324
Totals	1,048	371,141	354	1,047	286,000	273	1,003	351,411	350
Grey	583	211,046	362	456	139,080	305	541	198,535	367
Simcoe	562	206,254	367	559	207,948	372	588	212,098	361
Totals	1,145	417,300	364	1,015	347,028	342	1,129	410,633	364
Middlesex	655	230,560	352	466	123,024	264	489	153,268	313
Oxford	354	126,732	358	449	150,864	336	355	140,383	395
Brant	196	88,592	452	220	61,380	279	213	89,064	418
Perth	494	194,636	394	379	83,759	221	425	163,354	384
Wellington	380	139,080	366	280	65,240	233	308	100,459	326
Waterloo	375	145,875	389	406	131,950	325	331	135,769	410
Dufferin	109	34,117	313	155	48,050	310	151	50,553	335
Totals	2,563	959,592	374	2,355	664,267	282	2,272	832,850	367
Lincoln	108	35,100	325	155	36,580	236	118	36,910	313
Wentworth	239	93,688	392	265	53,000	200	229	83,470	364
Halton	105	38,640	368	156	62,400	400	125	49,567	397
Peel	238	81,634	343	325	94,900	292	303	105,516	348
York	818	330,472	404	689	227,370	330	724	297,692	411
Ontario	482	209,670	435	465	177.165	381	512	198,715	388
Durham	575	186,300	324	582	243,276	418	512	188,834	369
Northumberland	288	103,392	359	394	141,446	359	276	93,855	340
Prince Edward	65	18,590	286	126	18,900	150	61	12,816	210
Totals	2,918	1,097,486	376	3,157	1,055,037	334	2,860	1,067,375	373
Lennox and Addington	59	21,417	363	67	20,770	310	59	16,717	283
Frontenac	126	24,066	191	259	58,534	226	167	40,385	242
Leeds and Grenville	293	90,830	310	188	60,160	320	172	53,810	313
Dundas	86	34,400	400	83	12,782	154	56	17,862	319
Stormont	36	9,000	250	81	24,300	300	43	11,531	268
Glengarry	36	9,000	250	64	13 312	208	43	10,196	237
Prescott	39	11,739	301	50	12,750	255	50	13,667	273
Russell	240	73,440	306	177	55,401	313	139	43,117	310
Carleton	978	303,180	310	565	174,020	308	581	187,531	323
Renfrew	83	32,204	388	90	27,450	305	103	31,453	305
Lanark	165	68,805	417	99	36,630	370	133	46,761	352
Totals	2,141	678,081	317	1,723	496,109	288	1,546	473,030	306
Victoria	281	91,606	326	375	152,250	406	301	110,222	366
Peterborough	432	177,984	412	330	112,530	341	337	108.037	320
Haliburton	25	8,500	340	23	4,623	201	20	6,002	300
Hastings	251	68,021	271	207	61,893	299	164	47,163	288
Totals	989	346,111	350	935	331,296	354	822	271,424	330
Muskoka	100	25,000	250	84	32,844	391	78	20,337	261
Parry Sound	57	9,975	175	25	5,800	232	29	7,114	245
Nipissing	10	2,000	200	....	....	.....	1	222	200
Algoma	24	4,800	200	38	9,500	250	29	7,043	243
Totals	191	41,775	219	147	48,144	328	137	34,716	253
The Province	11,977	4,210,542	352	11,261	3,431,959	305	10,486	3,642,161	347

AREA AND PRODUCE—TURNIPS.

TABLE XXI. Showing by County Municipalities and groups of Counties the area and produce of Turnips in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the yield per acre.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.	Acres.	Bushels.	Bush. per acre.
Essex	174	65,250	375	192	21,696	113	198	56,281	284
Kent	404	144,632	358	285	86,355	303	345	117,335	340
Elgin	402	140,700	350	396	113,256	286	356	119,967	337
Norfolk	1,306	428,368	328	1,570	436,460	278	991	365.525	369
Haldimand	84	29,400	350	266	69,160	260	119	33,892	285
Welland	209	50,787	243	187	52,173	279	172	56,789	330
Totals	2,579	859,137	333	2,896	779,100	269	2,181	749,789	344
Lambton	302	93,620	310	379	75,800	200	300	94,681	316
Huron	6,620	2,992,240	452	6,685	2,125,830	318	6,659	2,557,050	384
Bruce	5,714	2,445,592	428	5,884	1,776,968	302	5,592	2,173,833	389
Totals	12,636	5,531,452	438	12,948	3,978,598	307	12,551	4,825,564	384
Grey	9,794	4,044,922	413	9,165	2,932,800	320	8,974	3,541.531	395
Simcoe	3,551	1,633,460	460	3,873	1,603,422	414	3,348	1,345,969	402
Totals	13,345	5,678,382	426	13,038	4,536,222	348	12,322	4,887,500	397
Middlesex	1,822	624,946	343	1,860	446,400	240	1,697	603,644	356
Oxford	5,905	2,486,005	421	5,827	1,619,906	278	5,327	2,188,878	411
Brant	3383	1,502,052	444	3,401	870,656	256	2,702	1,187,486	439
Perth	4,687	2,001,349	427	3,792	963,168	254	4,630	1,739,720	376
Wellington	12,994	5,327,540	410	12,872	4,363,608	339	12,908	5,340,982	414
Waterloo	4,780	1,940,680	406	4,858	1,248,506	257	5,049	1,959,214	388
Dufferin	2,745	1,092,510	398	2,455	927,990	378	2,383	885,858	372
Totals	36,316	14,975,082	412	35,065	10,440,234	298	34,696	13,905,782	401
Lincoln	262	94,320	360	270	88,830	329	233	79,325	340
Wentworth	3,073	1,545,719	503	3,125	978,125	313	2,457	1,131,057	460
Halton	1,728	886,464	513	1,876	487,760	260	1,695	738,920	436
Peel	1,381	615,926	446	1,553	509,384	328	1,324	483,972	366
York	4,410	1,869,840	424	4,193	1,320,795	315	3,326	1,282,470	386
Ontario	12,809	6,276,410	490	12.657	5,062,800	400	11,705	4,688,911	401
Durham	5,224	2,173,184	416	5,538	2,159,820	390	5,125	2,149,557	419
Northumberland	3,524	1,585,800	450	3,651	1,577,232	432	3,148	1,216,578	386
Prince Edward	98	37,338	381	174	17,400	100	116	25,722	222
Totals	32,509	15,085,001	464	33,037	12,202,146	369	29,129	11,796,512	405
Lennox and Addington	96	25,632	267	97	21,825	225	150	35,803	239
Frontenac	255	67,320	264	528	120,384	228	378	102,222	270
Leeds and Grenville	393	141,087	359	321	109,461	341	258	91,978	357
Dundas	71	20,093	283	82	20,500	250	65	18,645	287
Stormont	141	53,580	380	64	16,000	250	91	23,726	261
Glengarry	44	23,100	525	23	5,175	225	36	13,065	363
Prescott	62	20,336	328	118	34,574	293	108	39,380	365
Russell	573	236,649	413	356	170,880	480	309	120,976	392
Carleton	2,520	957,600	380	1,675	624,775	273	1,536	534,780	348
Renfrew	726	241,758	333	639	247,932	388	600	191,508	319
Lanark	479	180,583	377	576	230,400	400	471	165,542	351
Totals	5,360	1,967,738	367	4,479	1,601,906	358	4,002	1,337,625	334
Victoria	3,386	1,185,100	350	3,975	1,462,800	368	3,279	1,214,236	370
Peterborough	1,649	659,600	400	1,569	660,549	421	1,207	416,477	345
Haliburton	275	84,425	307	343	109,760	320	313	86,243	276
Hastings	835	265.530	318	1,452	429,792	296	839	231,612	276
Totals	6,145	2,194,655	357	7,339	2,662,901	363	5,638	1,948,568	346
Muskoka	796	299,296	376	1,169	482,797	413	968	298,989	309
Parry Sound	740	209,420	283	574	211,806	369	607	187,526	309
Nipissing	112	33,600	300	....	....	......	12	3,733	300
Algoma	517	206,800	400	558	125,550	225	489	165,007	337
Totals	2,165	749,113	346	2,301	820,153	356	2,076	655,255	316
The Province	111,055	47,040,563	424	111,103	37,021,260	333	102,595	40,106,595	391

RATIOS OF AVERAGE PRODUCTION.

TABLE XXII. Showing by County Municipalities and groups of Counties the per cent. ratios of total yields in 1890 to average of total yields for the nine years 1882-90.

Counties.	Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Pease.	Corn.	Buckwheat.	Beans.	Hay and clover.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.
Essex	70	155	205	91	91	103	124	116	162	120	73	162	158	116
Kent	83	266	115	77	203	94	111	154	191	131	70	182	172	123
Elgin	99	90	148	73	80	107	80	158	192	135	79	119	167	117
Norfolk	106	90	83	71	117	127	74	122	60	130	59	110	164	117
Haldimand	84	185	63	68	60	115	73	72	153	124	58	148	120	87
Welland	96	53	67	63	34	106	72	118	129	140	65	70	59	89
Group	89	171	101	75	109	111	103	125	183	130	68	136	149	115
Lambton	84	117	94	92	207	129	127	178	87	132	84	127	151	99
Huron	78	69	107	103	99	126	130	183	91	151	89	149	83	117
Bruce	79	112	88	112	229	125	208	187	132	152	97	177	123	113
Group	80	94	98	104	189	126	133	182	96	147	91	151	106	115
Grey	65	80	72	108	142	108	306	179	294	162	124	156	106	114
Simcoe	79	92	90	105	112	119	167	252	69	131	113	94	97	121
Group	74	86	82	106	118	112	223	217	190	149	119	119	102	116
Middlesex	97	54	107	91	171	113	111	79	102	136	98	141	150	104
Oxford	104	79	89	86	125	99	118	131	54	147	80	130	90	114
Brant	88	156	104	89	167	133	108	114	70	157	97	117	99	126
Perth	74	96	99	105	42	110	177	95	19	150	104	179	119	115
Wellington	47	125	92	112	72	108	227	334	106	141	114	158	138	100
Waterloo	87	67	119	98	109	127	114	152	159	127	100	139	107	99
Dufferin	47	127	102	105	41	129	237	83	136	138	123	147	67	123
Group	85	102	100	99	112	114	118	132	77	142	104	151	115	108
Lincoln	83	111	93	72	117	135	66	122	151	138	76	97	95	119
Wentworth	74	181	92	76	87	126	103	162	263	141	94	130	112	137
Halton	63	205	78	92	134	120	169	50	40	115	82	130	78	120
Peel	54	157	88	100	39	145	181	82	32	121	90	103	77	127
York	66	97	68	96	74	122	163	48	58	125	109	109	111	146
Ontario	44	68	65	88	48	88	111	223	80	139	89	150	106	134
Durham	125	65	53	79	75	91	115	258	117	142	79	140	99	101
Northumberland	115	83	57	97	102	120	123	181	89	133	102	116	110	130
Prince Edward	192	99	75	100	71	173	150	133	72	131	81	100	145	145
Group	72	88	69	90	80	118	115	162	102	132	93	121	103	128
Lennox and Addington	133	78	53	89	68	114	120	196	156	160	73	91	128	72
Frontenac	36	77	58	90	80	95	144	145	34	144	91	43	60	66
Leeds and Grenville	46	62	57	81	55	81	167	138	139	121	89	94	169	153
Dundas	23	66	56	73	35	88	121	169	92	110	107	67	193	108
Stormont	14	70	113	76	62	70	168	124	94	103	89	152	78	226
Glengarry	9	72	98	73	265	72	315	138	178	92	91	143	88	177
Prescott	61	95	138	97	17	81	131	103	50	137	115	264	86	52
Russell	16	72	139	111	212	106	205	150	81	118	115	410	170	196
Carleton	70	73	100	87	76	84	215	79	134	107	101	186	162	179
Renfrew	50	82	90	90	118	111	144	128	112	124	87	95	102	126
Lanark	47	69	99	96	60	96	181	87	102	102	85	135	147	109
Group	54	75	68	86	78	95	164	127	99	120	93	146	143	147
Victoria	28	96	73	98	149	116	115	363	168	134	118	140	83	98
Peterborough	67	98	50	94	162	124	202	274	241	147	109	160	165	158
Haliburton	177	121	94	111	150	132	108	214	105	113	96	169	142	98
Hastings	127	54	54	91	80	136	137	130	120	147	76	321	144	115
Group	76	88	61	95	101	126	138	177	153	142	95	190	128	113
Muskoka	43	82	99	109	85	143	108	152	95	161	96	104	123	100
Parry Sound	255	59	109	132	55	164	144	226	242	196	139	72	140	112
Nipissing	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Algoma	157	66	101	117	140	125	77	192	148	190	147	25	68	125
Group	154	69	112	125	93	144	113	186	151	189	135	79	120	114
The Province	81	89	79	93	90	115	116	142	155	135	96	142	116	117

RATIOS OF AVERAGE YIELD PER ACRE.

TABLE XXIII. Showing by County Municipalities and groups of Counties the per cent. ratios of average yields per acre in 1890 to average yields per acre for the nine years 1882-90.

Counties.	Fall wheat.	Spring wheat	Barley.	Oats.	Rye.	Pease.	Corn.	Buckwheat.	Beans.	Hay and clover.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.
Essex	84	89	87	68	84	95	102	79	91	109	77	145	135	132
Kent	102	92	89	72	101	79	104	100	102	126	77	116	114	105
Elgin	110	106	88	69	94	73	86	102	90	123	84	99	116	104
Norfolk	113	96	84	68	93	84	80	106	85	124	71	95	90	89
Haldimand	93	83	70	61	86	86	74	120	82	126	65	124	122	123
Welland	106	85	71	57	87	74	78	110	79	137	68	91	78	74
Group	102	90	83	67	93	81	97	104	99	124	75	112	109	97
Lambton	96	103	81	70	112	82	102	78	66	119	80	113	112	98
Huron	112	121	92	86	87	92	86	106	94	130	98	107	98	118
Bruce	113	109	101	93	109	108	83	83	93	127	100	103	105	110
Group	108	112	91	84	106	97	96	85	76	126	92	107	101	114
Grey	92	96	103	94	79	102	103	105	113	148	125	91	99	105
Simcoe	88	87	92	89	87	101	108	108	93	120	104	101	102	114
Group	90	91	96	92	85	101	102	106	107	137	114	97	100	107
Middlesex	115	114	93	80	100	86	95	112	99	129	91	110	112	96
Oxford	118	102	92	78	103	76	96	89	63	138	83	99	91	102
Brant	118	122	90	79	113	99	105	97	102	152	99	103	108	101
Perth	110	118	95	88	101	88	89	120	102	139	114	105	103	114
Wellington	96	121	97	89	96	94	102	105	104	129	109	105	112	99
Waterloo	104	113	97	80	101	94	98	100	97	123	100	98	95	105
Dufferin	95	106	98	78	82	100	97	103	93	134	98	130	93	107
Group	112	112	95	83	101	90	96	102	90	134	100	105	102	103
Lincoln	97	80	78	63	84	87	70	97	96	145	83	116	104	106
Wentworth	93	96	79	72	89	98	89	92	84	150	80	100	108	109
Halton	83	92	86	78	81	93	116	125	91	125	85	98	93	118
Peel	85	93	85	81	85	101	97	138	71	126	82	105	99	122
York	97	77	76	80	114	97	93	67	95	125	100	99	98	110
Ontario	96	63	74	79	82	83	92	91	78	122	82	119	112	122
Durham	108	66	65	73	93	88	100	100	94	132	78	94	88	99
Northumberland	100	79	79	85	94	119	98	100	77	121	94	108	106	117
Prince Edward	128	94	95	94	100	124	123	107	88	115	85	122	136	172
Group	94	75	79	79	93	98	96	101	84	128	88	104	101	115
Lennox and Addington	108	72	79	79	97	102	103	102	108	121	77	112	128	112
Frontenac	83	71	83	83	87	101	106	108	72	137	86	89	79	98
Leeds and Grenville	83	62	74	73	80	93	104	107	94	113	87	88	99	101
Dundas	84	71	70	72	95	116	94	111	102	96	117	85	125	99
Stormont	66	78	83	82	85	108	128	106	87	89	92	81	93	146
Glengarry	76	71	89	73	90	102	136	94	79	82	97	108	105	145
Prescott	97	86	84	83	79	109	135	89	66	102	124	112	110	90
Russell	90	81	96	92	106	98	124	106	82	102	120	123	99	105
Carleton	128	64	86	83	100	107	103	102	103	96	97	100	96	109
Renfrew	107	75	78	85	88	108	89	102	84	121	86	91	127	104
Lanark	67	62	82	87	82	96	126	95	80	103	90	120	118	107
Group	90	70	82	80	90	104	109	104	86	107	94	102	104	110
Victoria	78	87	88	91	101	108	93	115	117	119	106	100	89	95
Peterborough	82	87	83	89	92	116	108	117	121	138	92	110	129	116
Haliburton	88	85	86	98	97	101	82	152	102	110	91	98	113	111
Hastings	97	77	78	88	105	122	102	96	112	132	82	116	94	115
Group	89	85	84	90	100	115	101	104	113	129	92	103	106	103
Muskoka	87	93	93	92	89	107	96	88	108	148	93	130	96	122
Parry Sound	78	72	96	86	115	95	92	115	94	130	96	144	71	92
Nipissing	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Algoma	99	82	82	77	100	92	89	90	101	132	102	104	82	119
Group	94	82	91	87	96	96	94	95	100	138	98	126	87	109
The Province	102	84	86	81	94	97	97	102	96	125	94	105	101	108

ACREAGE UNDER CROP; ALSO PASTURE AND ORCHARD.

TABLE XXIV. Showing by County Municipalities and groups of Counties in Ontario the total area under crop enumerated in Tables VIII—XXI, for the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the area in Pasture and in Orchard and Garden for the same period.

Counties.	Acres in crop.			Pasture.		Orchard and garden.		
	1890.	1889.	1882-90.	1890.	1889.	1890.	1889.	1882-90.
Essex	165,950	145,522	143,228	30,784	28,500	6,050	6,210	5,997
Kent	228,010	217,670	209,321	47,661	47,721	7,294	7,356	7,407
Elgin	179,476	167,292	167,391	68,604	68,386	7,031	7,228	7,024
Norfolk	165,103	156,817	154,941	39,299	43,153	7,626	8,078	7,766
Haldimand	146,604	147,924	141,934	35,488	35,715	4,446	4,391	4,547
Welland	111,812	114,634	110,687	24,271	26,148	7,070	6,436	6,804
Totals	996,955	949,859	927,502	246,107	249,623	39,517	39,699	39,545
Lambton	200,371	182,334	172,841	74,054	65,999	7,205	6,718	6,310
Huron	354,703	340,239	332,629	154,177	146,741	8,652	8,613	8,455
Bruce	296,860	290,184	275,264	111,753	106,688	5,743	5,774	5,694
Totals	851,934	812,757	780,734	339,984	319,428	21,600	21,105	20,459
Grey	366,695	378,771	358,366	141,680	137,924	6,741	7,124	7,170
Simcoe	329,666	340,702	307,720	72,881	83,163	5,117	4,605	4,734
Totals	696,361	719,473	666,086	214,561	221,087	11,858	11,729	11,904
Middlesex	315,485	308,768	304,514	166,959	162,980	10,336	9,773	10,451
Oxford	227,218	219,772	217,203	85,098	84,826	7,862	7,863	8,387
Brant	124,582	118,876	120,847	26,927	29,940	3,574	3,993	4.474
Perth	241,528	235,045	232,965	80,937	81,231	4,754	4,658	4,836
Wellington	315,676	304,193	295,323	85,926	85,582	4,378	4,682	4,815
Waterloo	175,268	165,350	164,761	32,732	31,908	4,948	4,869	5,184
Dufferin	139,408	129,304	124,555	35,033	35,151	1,486	1,418	1,501
Totals	1,539,165	1,481,308	1,460,168	513,612	511,618	37,338	37,256	39,648
Lincoln	103,252	99,807	101,708	22,747	28,281	8,150	7,714	7,882
Wentworth	146,854	145,329	143,621	35,020	39,022	8,861	8,847	9,049
Halton	110,523	110,170	107,344	33,493	38,506	4,859	4,947	4,834
Peel	176,051	175,772	162,959	33,399	38,687	4,207	4,360	4,220
York	311,787	312,065	300,106	53,467	59,127	6,285	6,591	7,609
Ontario	257,408	260,533	246,851	55,462	57,360	4,908	4,733	5,251
Durham	203,532	202,018	203,435	43,806	48,510	3,047	3,251	3,798
Northumberland	225,911	225,941	217,798	60,200	64,300	6,304	6,162	6,443
Prince Edward	133,996	136,326	130,827	31,469	36,623	5,817	5,637	6,146
Totals	1,669,314	1,667,961	1,614,649	369,063	410,416	52,438	52,242	55,232
Lennox & Add'n.	149,268	143,514	140,635	44,636	51,282	2,358	2,600	2,748
Frontenac	141,160	149,402	140,799	56,476	54,167	1,964	1,993	2,205
Leeds & Gren	250,662	246,299	237,041	136,204	154,167	2,513	2,961	3,142
Dundas	88,834	91,328	85,937	40,413	39,031	1,252	1,109	1,188
Stormont	75,583	75,243	72,719	35,668	39,587	767	764	982
Glengarry	92,220	94,656	87,585	46,145	41,217	584	565	582
Prescott	100,991	86,019	85,098	29,763	34,576	284	462	287
Russell	58,382	46,372	49,792	19,047	25,658	54	116	147
Carleton	196,315	189,290	183,116	70,232	70,730	299	269	533
Renfrew	173,227	175,633	163,594	63,279	70,435	186	229	539
Lanark	147,795	153,164	144,211	99,734	104,551	837	1,011	1,085
Totals	1,474,437	1,450,920	1,390,527	641,597	685,401	11,098	12,079	13,438
Victoria	178,308	181,107	173,020	42,419	39,674	1,377	1,541	1,751
Peterborough	148,107	147,414	141,307	52,334	56,298	1,734	1,803	1,935
Haliburton	22,544	22,192	20,105	5,611	5,233	111	92	100
Hastings	220,158	231,630	222,188	94,939	89,989	5,108	4,694	5,403
Totals	569,117	582.343	556,620	195.303	191,194	8,330	8,130	9,189
Muskoka	42,056	41,439	37,724	8,776	9,582	422	356	358
Parry Sound	29,074	20,869	20,076	6,314	4,631	15	17	27
Nipissing	8,308	....	923	1,417	....	11	....	1
Algoma	35,576	31,654	27,418	5,358	4,982	169	153	152
Totals	115,014	93,962	86,141	21.865	19,195	617	526	538
The Province	7,912,297	7,758,583	7,482,427	2,542,092	2,607,962	182,796	182,766	189,953

RATIOS OF AREAS UNDER CROP.

TABLE XXV. Showing by County Municipalities and groups of Counties the number of acres under the various crops in Ontario in 1890, per 1,000 acres of cleared land.

Counties.	Fall wheat.	Spring wheat.	Barley.	Oats.	Rye.	Pease.	Corn.	Buckwheat.	Beans.	Hay and clover.	Potatoes.	Mangel-wurzels.	Carrots.	Turnips.	Totals.
Essex	122.3	13.7	37.2	192.4	4.2	19.7	181.2	4.4	4.2	188.5	12.2	1.0	.5	.8	782.3
Kent...........	158.5	33.6	28.7	115.1	4.9	41.9	90.6	4.5	82.1	175.5	9.9	1.5	.8	1.3	748.9
Elgin	140.0	5 2	28.8	124.0	4.0	68.1	47.7	7.4	9.3	195.2	9.5	1.2	.8	1.4	642.6
Norfolk ..	130.6	3.3	26.0	120.2	41.5	101.8	55.6	23.1	1.6	181.7	12.0	1.0	1.2	5.6	705.2
Haldimand	144.4	35.7	62.0	125.0	2.8	89.6	9.4	2.1	1.6	236.4	6.5	1.0	.4	0.4	717.3
Welland	124.2	5.5	22.0	132.4	1.5	37.1	34.4	11.3	7.1	292.3	13.8	.7	.4	1.3	684.0
Group	138.6	16.8	33.7	132.9	10.0	60.2	71.5	8.6	21.7	205.0	10.5	1.2	.7	1.8	713.2
Lambton	97.9	23.2	56.6	180.9	1.5	51.7	30.1	3.6	1.5	193.5	10.2	1.4	.9	1.0	654.0
Huron	79.8	16.6	57.4	167.8	.6	80.8	4.5	.8	.2	195.5	8.8	3.8	.7	11.7	629.0
Bruce	71.5	30.0	36.3	160.8	2.1	95.0	4.0	1.9	.3	220 7	10.1	1.7	.8	12.5	647.7
Group	81.1	22.8	49.9	168 4	1.3	79.0	10.2	1.8	.6	203.7	9.6	2.5	.8	9.5	641.2
Grey	33.5	60.3	28.1	182.2	1.9	86.8	3.6	1.1	.6	225.4	12.2	1.2	1.0	17.5	655.4
Simcoe	99.4	76.2	63.5	156.9	6.3	77.8	2.8	1.9	.2	173.4	15.3	1.2	1.1	7.4	683.4
Group	64.0	67.7	44.5	170.5	3.9	82.6	3.2	1.5	.4	201.4	13.6	1.2	1.1	12.8	668.4
Middlesex......	112.6	9.3	33.2	157.4	1.7	55.8	24.2	7	.6	175.7	11.4	3.3	1.2	3.4	590.5
Oxford	97.8	20.7	47.7	168.0	4.3	59.5	31.1	2.7	.5	190.8	9.1	4.8	1.0	17.0	655.0
Brant	125.0	9.1	128.8	120.9	9.5	72.0	28.9	4.6	1.6	191.6	12.7	2.4	1.1	19.8	728.0
Perth	81.1	27.1	50.6	187.2	.2	80.3	4.6	.2	....	198.0	9.3	7.8	1.4	12.8	660.6
Wellington	27.5	47.3	77.3	206.8	1.4	98.5	3.5	1.3	.1	205.5	14.1	3.2	.9	29.5	716.9
Waterloo	135.7	11.8	86.9	184.7	2.4	83.4	6.2	.6	.2	182.1	12.1	2.9	1.6	19.9	730.5
Dufferin	25.1	127.3	64.2	205.5	1.8	78.8	1.2	.4	.1	175.5	20.1	.7	.6	14.1	715.4
Group	84.9	31.4	62.0	177.5	2.5	74.5	14.7	1.3	.4	189.1	12.1	3.9	1.1	15.8	671.2
Lincoln	118.7	19.7	34.7	132.0	4.0	50.2	39.0	5.5	1.7	253.2	11.4	1.3	.7	1.7	673.8
Wentworth.....	113.5	24.5	73.9	145.6	4.6	67.1	24.9	6.4	2.6	199.9	20.2	2.8	1.1	14.7	701.8
Halton	96.0	52.0	70.8	132.2	5.2	80.9	10.6	.4	.1	179.9	9.0	3.3	.6	10.2	651.2
Peel	66.8	93.1	152.6	153.8	2.4	84.8	4.6	.6	.1	148.7	13.3	1.9	1.0	5.7	729.4
York	58.8	80.2	124.4	186.5	2.7	87.9	6.6	.4	.2	174.7	20.1	4.7	2.0	10.7	759.9
Ontario	12.2	150.6	100.3	161.4	4.5	82.2	9.4	3.6	.7	175.9	13.2	2.9	1.5	37.6	756.0
Durham	15.6	131.3	138.7	133.9	14.3	81.2	8.0	14.7	1.4	172.0	11.7	2.6	2.1	19.2	746.7
Northumberland	40.1	90.9	100.9	107.4	38.5	62.8	16.0	34.4	1.8	182.3	14.6	1.5	.9	11.0	703.1
Prince Edward .	18.3	37.7	173.8	79.4	34.7	103.7	40.2	46.3	2.1	184.2	12.7	.6	.4	.5	734.6
Group	53.5	85.0	111.6	142.2	12.3	78.8	15.1	11.9	1.1	181.5	14.6	2.6	1.3	14.1	725.6
Lennox & Add'n	12.9	31.8	126.2	123.0	16.8	48.1	13.2	27.7	1.2	311.2	15.0	.5	.3	.5	728.4
Frontenac	3.2	42.8	57.0	136.0	15.4	46.8	11.2	9.5	.6	297.9	19.6	.4	.6	1.2	642.2
Leeds & Gren ..	6.4	31.4	19.9	172.3	9.9	13.2	22.5	16.9	1.3	284.4	17.6	.6	.7	.9	598.0
Dundas	2.1	31.2	39.3	219.5	3.6	9.3	16.4	17.8	1.7	295.0	16.3	.6	.6	.5	653.9
Stormont.......	1.1	34.6	28.0	189.9	2.8	13.9	14.4	19.9	1.6	317.4	16.9	.5	.3	1.2	642.5
Glengarry	.4	54.1	16.7	206.9	1.4	27.0	13.9	10.7	1.6	276.7	15.5	.6	.3	.3	626.1
Prescott........	.3	65.4	36.1	223.9	.4	46.2	9.2	12.7	2.6	314.3	15.9	1.5	.3	.4	729.2
Russell..	.3	44.2	27.6	278.4	5.9	50.2	9.3	17.1	2.4	258.8	17.8	3.0	3.0	7.1	725.1
Carleton	2.7	86.8	32.3	219.8	15.7	34.5	11.5	9.8	2.1	224.3	21.8	3.7	3.4	8.7	677.1
Renfrew	1.6	100.8	6.4	164.7	34 7	81.0	3.0	5.3	2.4	241.5	14.5	.4	.3	2.8	659.4
Lanark	7.6	56.2	12.5	143.8	11.8	39.8	7.1	17.2	1.0	206.8	11.7	.6	.6	1.6	518.3
Group	4.3	54.6	34.6	178.8	12.9	37.2	12.5	14.5	1.6	268.7	16.7	1.1	.9	2.3	640.7
Victoria	11.6	145.2	105.1	172.0	7.4	70.0	3.0	7.8	.5	174.7	14.3	3.1	1.1	13.9	729.7
Peterborough...	35.9	124.5	34.1	136.8	26.3	69.5	3.3	8.4	1.2	172.8	13.7	1.9	1.9	7.1	637.4
Haliburton	9.0	64.9	10.3	193.2	13.7	70.1	4.9	11.4	.9	340.9	24.1	.4	.8	9.2	753.8
Hastings	35.5	31.4	80.7	130.2	31.6	62.2	23.8	15.7	1.0	227.0	15.9	3.2	.7	2.5	661.4
Group	27.7	91.5	72.4	146.4	22.5	66.8	11.4	11.2	.9	200.8	15.1	2.7	1.2	7.3	677.9
Muskoka	.6	21.7	10.2	189.5	6.6	67.4	4.0	9.9	.7	402.4	25.1	.7	1.8	14.3	754.9
Parry Sound....	3.7	27.2	18.0	180.3	3.7	59.8	1.3	4.7	1.0	347.3	26.4	.1	1.4	17.6	692.5
Nipissing.......	1.8	22.9	17.1	147.2	7.2	61.4	3.1	7.5	1.0	415.0	38.0	.1	.9	9.9	733.1
Algoma	14.9	103.4	15.2	148.5	6.6	112.2	1.4	3.2	.5	320.6	22.8	.1	.5	11.1	761.0
Group	5.8	47.8	14.3	171.7	5.8	78.4	2.5	6.3	.7	363.9	25.7	.3	1.2	13.9	738.3
The Province ..	61.8	51.6	60.2	161.5	8.8	67 0	19.2	7.7	3.4	211.2	13.6	2.2	1.0	9.5	678.7

PART II.

LIVE STOCK, THE DAIRY AND THE APIARY.

LIVE STOCK.

"Owing to the plentifulness of fodder and the mildness of the winter," ran the account in the May bulletin, "the present condition of live stock is with few exceptions all that could be desired. In very many cases there is a superabundance of food, which will be carried over. Hay is very cheap, ranging as low in one instance as $4 per ton. A few instances are reported, however, from the extreme south-west in which there appears to have been some scarcity in the root supply, and where the corn crop was too largely depended upon for fodder. Cattle are generally thrifty and strong, although a few correspondents (especially in the district referred to) report them as thin in flesh. Horses are in an exceptionally good condition for spring work. The mild winter and small amount of labor would seem to have been unusually favorable to them. Sheep and pigs are also thrifty generally, except in cases where they were allowed the run of the fields throughout the winter. Sheep are reported as scarce in parts, but the lambing season has been a favorable one and there is a probable increase in the number of lambs all over. There seems also to be an increase in the number of young pigs, but complaint comes from the east that there has been an unusual mortality among them from some unknown cause. Distemper and influenza have also been strongly marked among horses. Some describe the symptoms as approaching those of la grippe, but there is a marked immunity from all malignant types."

According to the August bulletin most encouraging reports came from the eastern half of the province regarding the condition of pastures, but in the west and in the Niagara peninsula the dry weather appeared to have affected the fields more unfavorably. The abundant supply of hay and straw augurs well for the fall and the winter keep of stock, although of course much would depend upon the root crops. Stock generally were in fair condition, but good cattle were picked up very early in the season and there was not likely to be as many animals as usual left for fattening. While in the western districts complaints were made that the flow of milk was falling off considerably owing to the drouth, the great cheese producing counties along the St. Lawrence and in the county of Hastings appeared to feel but little difference in this respect, and reported much activity in the factories. The low price offered for milk was commented upon by several correspondents in the western part of the province.

The November bulletin contained the following cheerful references to the condition of live stock: "Fall pastures have been in unusually fine condition all over the province, and are for the most part still quite fresh and green owing to the abundance of warm showery weather. Hay is very abundant, and of straw and coarse feed there is about a sufficiency. All kinds of live stock are consequently in a thriving condition, but with the exception of hogs their numbers are somewhat small. Few farmers have yet commenced to stall-feed their cattle, but the supply of fodder for the winter months will be more than sufficient. Sheep are in good condition, but not numerous. Many farmers are fattening lambs for the December market, and there has been a greater demand than usual for breeding sheep. There is quite a notable increase in the number of hogs all over the province, and especially in the southern and south-western counties. Great numbers have already been finished and marketed on foot, and the rest are being rapidly fattened. The demand for all kinds of live stock has so far been brisk; in some localities in the southern part of the province buyers have picked up nearly everything, and fair prices have been paid."

HORSES. The following table gives the number of horses by county groups and for the province in each of the five years 1886-90, those for 1890 being also divided into classes :

Horses.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Working horses..	42,394	31,238	26,329	62,351	69,231	61,305	22,191	3,421	318,460
Breeding mares.	19,498	15,615	11,167	26,479	26,995	22,038	7,863	1,498	131,153
Unbroken horses	32,343	25,365	16.201	40,811	44,345	35,616	13,747	1,595	210,023
Totals.... 1890	94,235	72,218	53,697	129,641	140,571	118,959	43,801	6,514	659,636
1889	84,975	66,750	52,855	124,325	131,551	111,250	42,135	4,954	618,795
1888	81,481	63,098	50,240	119,001	127,929	109,161	40,763	4,545	596,218
1887	77,539	59,936	47,774	114,529	125,713	105,900	39,938	4,032	575,361
1886	77,949	59,879	46,828	111,454	126,204	105,228	38,066	4,041	569,649

The table shows that among the farm stock of the province there are 318,460 working horses, 131,153 breeding mares and 210,023 unbroken horses, making a total of 659,636 or 40,481 more than the number reported last year. There has been an increase in the total number of horses every year given. Each group also surpasses its own figures for any previous year, the number of horses in 1890 being as follows for each district : Lake Erie 94,235, Lake Huron 72,218, Georgian Bay 53,697, West Midland 129,641, Lake Ontario 140,571, St. Lawrence and Ottawa 118,959, East Midland 43,801, Northern Districts 6,514.

HOGS. The appended table shows the total number of hogs by county groups and for the province in each of the years 1886-90, and gives the numbers over and under one year for 1890 :

Hogs.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Over 1 year.	46,732	21,037	18,892	37,047	36,330	49,909	19,152	3,095	232,194
Under 1 year	195,903	86,469	76,736	202,263	174,655	106,714	56,047	9,578	908,365
Totals 1890	242,635	107,506	95,628	239,310	210,985	156,623	75,199	12,673	1,140,559
1889	197,015	73,096	74,104	171,444	148,233	115,645	48,411	7,521	835,469
1888	186,184	71,343	72,852	165,407	148,291	118,387	49,413	7,202	819,079
1887	185,843	69,700	71,015	162,601	154,678	126,061	56,799	6,120	832,817
1886	183,358	69,942	76,193	166,002	170,014	137,263	50,327	7,026	860,125

The number of hogs in the province has taken a tremendous leap upward compared with the returns for the previous or any preceding year, the increase in the number under one year being particularly large. It is not too much to assume that the bulletin entitled "The Swine Industry in Ontario," issued by this department in November, 1889, has been a considerable factor in contributing to this remarkable increase. The total number of all classes of hogs in the province is 305,090 more than in the previous year, an addition of nearly 37 per cent. Every group exhibits an increase over its figures for any previous year. The swine industry in Ontario is most largely followed in the Lake Erie and West Midland groups.

HORNED CATTLE. In the following table the number of horned cattle is shown by classes for 1890 (milch cows being given also for 1889), and the total number is given for each year since 1886 by county groups and for the province :

Cattle.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Working oxen		1,497	911	1,559	810	781	798	1,921	1.890	10,167
Milch cows ...	1890..	86,520	74,690	56,281	155,643	121,643	209,490	62,380	11,191	777,838
	1889..	87,594	75,577	59,119	158,255	124,002	203,188	62,809	8,627	779,171
Store cattle over 2 yrs..		42,125	69,048	36,442	87,420	42,495	47,637	18,106	4,367	347,640
Young and other cattle		92,484	107,087	76,493	170,386	107,072	141,553	49,498	14,494	759,067
Totals	1890	222,626	251,736	170,775	414,259	271,991	399,478	131,905	31,942	1,894,712
	1889	224,401	250,936	172,527	417,907	293,214	374,038	132,928	25,948	1,891,899
	1888	226,331	249,858	175,020	418,438	300,757	395,656	136,891	25,687	1,928,638
	1887	232,334	244,961	170,157	429,356	312,483	395,230	138,977	24,766	1,948,264
	1886	239,183	250,631	178,296	447,929	326,751	412,176	137,991	25,216	2,018,173

The total number of cattle in the province is 1,894,712, which, although 2,813 more than in 1889, is considerably less than the figures returned for any other year in the table. But although the total number of cattle has increased compared with the previous year, the number of milch cows in the province has decreased by 1,333. There has been a falling off in the number of this class in every group excepting the St. Lawrence and Ottawa counties (where the immense decline of last year has been more than regained) and the Northern Districts. While the largest number of all classes of cattle is to be found in the beef-raising West Midland group, by far the greatest number of milch cows appear in the dairying counties comprising the St. Lawrence and Ottawa District. The number of working oxen is decreasing with the advancement of settlement and general civilisation, being less by 2,405 than in 1888, or a falling off of 19 per cent. in two years.

SHEEP. The number of sheep is presented in the following table by county groups and for the province in each of the years 1886-90 :

Sheep.		Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Over 1 year.		99,594	107,747	98,551	150,078	111,970	165,200	46,074	16,049	795,263
Under 1 year		73,365	80,114	64,587	105,325	77,110	102,011	30,654	11,266	544,432
Totals	1890	172,959	187,861	163,138	255,403	189,080	267,211	76,728	27,315	1,339,695
	1889	146,038	172,656	167,947	257,840	214,475	275,905	89,084	20,235	1,344,180
	1888	147,428	167,270	163,944	254,755	223,363	283 237	91,045	18,002	1,349,044
	1887	152,850	169,459	167,592	258,590	216,450	315,130	97,805	18,285	1,396,161
	1886	171,238	191,776	189,405	300,149	263,571	369,851	105,664	19,295	1,610,949

The total number of sheep in the province is 1,339,695, which is less by 4,485 than in the previous year, and the least also of any of the years comprising the table. This decrease has been mainly confined to sheep over one year old, in which class there has been a decline for some years ; but the number of young sheep has increased compared with the returns of 1888 and 1889. A marked addition has been made to the total number of sheep in the Lake Erie and Lake Huron groups and the Northern Districts, although there is a falling off in the other five groups.

THE WOOL CLIP. The following table gives the number of fleeces with their total and average weights, by county groups and for the province for the years 1889 and 1890, together with the averages for the nine years 1882-90 :

Districts.	1890.			1889.			1882-90.		
	Fleeces.	Pounds.	℔. per fleece.	Fleeces.	Pounds.	℔. per fleece.	Fleeces.	Pounds.	℔. per fleece.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Lake Erie	99,241	553,372	5.58	84,517	485,196	5.74	106,684	593,490	5.56
Lake Huron	108,948	650,357	5.97	104,817	615,403	5.87	121,451	694,403	5.72
Georgian Bay	99,818	567,196	5.68	104,259	588,106	5.64	114,362	630,014	5.51
West Midland....	151,915	893,332	5.89	154,937	882,542	5.70	191,769	1,089,563	5.68
Lake Ontario	114,650	681,541	5.94	129,417	755,834	5.84	158,226	928,641	5.87
St. Law. & Ottawa.	168,454	874,573	5.19	178,774	894,353	5.00	224,995	1,094,626	4.87
East Midland.....	47,888	261,926	5.47	56,261	291,425	5.18	67,548	350,293	5.19
Northern Districts	16,572	92,400	5.58	12,948	76,037	5.87	11,600	64,984	5.60
The Province.	807,486	4,574,700	5.67	825,930	4,588,896	5.56	996,635	5,446,014	5.46

The total number of fleeces is less by 18,444 than in the previous year, but falls off 189,149 compared with the average for the nine years. The weight per fleece is 5.67 lb., being .11 lb. above that of 1889 and 21 lb. higher than the average for the years 1882-90, which brings the total weight of wool within 14,196 lb. of that of the previous year, although it is still very much below the weight of the average of the nine years. The St. Lawrence and Ottawa and West Midland groups lead in the number of fleeces, but the former district has an averege weight per fleece of only 5.19 lb. (it is also the lowest for the nine years), while the Lake Huron counties average 5.97 and the Lake Ontario group comes second with 5.94. With their positions reversed these two groups also lead in the average weight per fleece for the nine years.

POULTRY. The number of poultry to all classes in each of the five years 1886-90, is given by county groups and for the province in the appended table :

Poultry.		Lake Erie.	LakeHuron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.
Turkeys ...		56,949	37,380	33,998	86,580	97,777	125,206	23,626	5,226	466,742
Geese		49,941	50,626	45,588	83,214	88,222	87,914	27,500	5,517	438,722
Other fowls.		786,317	690,432	504,854	1,254,594	1,164,132	1,081,643	386,511	80,917	5,949,400
Totals	1890	893,207	778,638	584,410	1,424,388	1,350,131	1,294,763	437,637	91,660	6,854,864
	1889	879,552	727,269	557,286	1,342,071	1,130,730	1,170,461	430,424	66,505	6,304,298
	1888	861,584	712,798	548,482	1,303,997	1,112,998	1,139,227	422,163	62,865	6,164,114
	1887	942,641	703,849	549,889	1,292,085	1,260,654	1,182,717	444,762	61,764	6,438,361
	1886	1,007,965	740,057	579,679	1,377,089	1,371,697	1,394,001	433,790	64,637	6,968,915

The total number of all classes of poultry is given at 6,854,864, which is 550,556 more than the number reported in the previous year. An increase appears in every group. The largest number of turkeys is found in the St. Lawrence and Ottawa counties, the greatest number of geese is reported in the Lake Ontario group, and the West Midland counties lead in the number of other fowls and in the total number of all classes of poultry, closely followed in both particulars by the two districts previously named.

THE DAIRY.

The following summary of the condition of the dairying business appeared in the November bulletin: "The past season has been a favorable one to the dairying industry, with plenty of grass and water. In the eastern part of the province especially cheese-making has flourished, and farmers seem well satisfied with the returns. Throughout the rest of the province cheese appears to have taken the lead also, and to have given better results than butter, except in the neighborhood of cities and large towns. Cheese factories are everywhere more numerous than creameries, and it is hard to make a comparison of the two products. There are many creamery advocates, however, and many express a desire to see them established in their neighborhoods. The large percentage of butter is still made by the farmer's wife for home and local consumption. But the quality is very uneven and the quantity irregular, and for these reasons some suggest that it would be better to have butter for the market made by the creameries alone in order that greater uniformity might be secured, as in the case of cheese. Durhams and their grades are still the favorite breed for the dairy cow in the west, but Holsteins and Jerseys are being introduced to a considerable extent where butter is made, and they are well liked. In the east, Holsteins, Ayrshires and Durhams and their grades are the most popular breeds."

CHEESE. The total number of factories reported to the Bureau as in operation in 1890 was 817, being 33 more than in the previous year, and 69 more than the average for the eight years 1883-90. The following table gives the statistics for these factories for each of the years named, based on the returns of factories which have reported during the several years, together with the annual averages for the eight years' period:

Year.	Factories in operation.	Quantity of—		Gross value of cheese.	Average No. of patrons.	Average No. of cows.	Milk required to make 1 lb. cheese.	Value of cheese per 100 lb.	Average date of opening.	Average date of closing.
		Milk used.	Cheese made.							
	No.	lb.	lb.	$			lb.	$ c.		
1890...	817	836,387,516	79,364,713	7,189,957	44,838	304,584	10.54	9 06	May 4	Oct. 31
1889...	784	760,146,327	72,592,847	6,787,619	43,215	273,231	10.47	9 35	" 4	" 30
1888...	737	686,369,013	65,299,751	6,031,470	42,065	256,780	10.51	9 24	" 5	" 24
1887...	737	691,934,579	65,638,656	6,918,913	42,512	254,510	10.54	10 54	" 4	" 27
1886...	770	654,703,243	63,721,621	5,893,818	37,665	237,106	10.27	9 25	" 7	" 29
1885...	752	733,437,254	71,209,719	5,781,569	44,208	260,244	10.30	8 12	" 4	" 29
1884...	751	685,964,727	66,939,573	6,998,889	38,646	254,852	10.25	10 46	" 3	" 30
1883...	635	539,696,197	53,513,032	5,589,339	32,636	193,840	10.08	10 45	" 3	" 30
1883-90	748	698,579,857	67,284,989	6,398,947	40,723	254,395	10.38	9 51	" 4	" 29

The quantity of milk used in the manufacture of cheese in 1890 is 76,241,189 lb. above the figures for the previous year, and the quantity of cheese made therefrom is 6,771,866 lb. more than the make of 1889, which led the other years of the table in both respects. An increase of $402,388 is observed in the total value of cheese manufactured, although the value of cheese per 100 lb. fell from $9.35 in the previous year to $9.06. The average quantity of milk required to make a pound of cheese was 10.54 lb., exactly the same as reported in 1887, but more than in any other year comprising the table, and .16 lb. more than the average for the eight years. There is an increase of 1,623 in the number of patrons, and of 31,353 in the number of cows. The average date of opening was May 4th, the same as that for the eight years, but the average date of closing was two days later than that of 1883-90.

The following table presents statistics of an average factory by county groups and for the province. It will be observed that the figures vary greatly in some of the groups, the western factories being much more largely patronised than those in the east:

Districts.		Quantity of—		Gross value of cheese.	Average No. of patrons.	Milk required to make 1 lb. cheese.	Value of cheese per 100 lb.	Average date of opening.	Average date of closing.
		Milk used.	Cheese made.						
		lb.	lb.	$		lb.	$ c.		
Lake Erie …	1890….	1,048,787	98,282	8,863	72	10.67	9.02	May 4	Nov. 6
	1889….	895,015	83,800	7,642	68	10.68	9.12	" 8	" 2
Lake Huron.	1890…	1,106,257	102,880	9,353	84	10.75	9.09	" 15	Oct. 29
	1889….	1,010,109	95,246	8,800	83	10.61	9.24	" 16	" 21
Georgian Bay	1890….	737,871	70,384	6,276	60	10.48	8.91	" 21	" 16
	1889….	626,989	59,646	5,457	50	10.51	9.15	" 10	" 14
West Midland.	1890….	1,621,221	151,531	13,909	74	10.70	9.18	" 1	Nov. 8
	1889….	1,545,984	144,797	13,605	75	10.68	9.40	" 2	" 8
Lake Ontario	1890….	819,430	77,779	6,977	51	10.54	8.97	" 4	Oct. 28
	1889…	725,992	69,438	6,506	51	10.46	9.37	" 6	" 28
St. Lawrence and Ottawa.	1890….	818,580	78,548	7,034	41	10.42	8.96	" 3	" 28
	1889….	793,080	77,261	7,207	40	10.26	9.33	" 2	" 29
East Midland	1890….	978,570	94,972	8,682	46	10.30	9.14	" 1	Nov. 1
	1889….	883,568	86,516	8,269	44	10.21	9.56	" 2	Oct. 31
The Province	1890….	1,023,730	97,142	8,800	55	10.54	9.06	" 4	" 31
	1889….	969,574	92,593	8,658	55	10.47	9.35	" 4	" 30
	1883-90.	934,086	89,968	8,556	54	10.38	9.51	" 4	" 29

These averages are computed from the aggregates of factories returned. For the province the average number of patrons per factory is 55, the same number as in the preceding year, but one more than the average for the eight years. There is an increase of 54,156 lb. of milk per factory, and an addition of 4,549 lb. in the quantity of cheese made, compared with the previous year, and the total value of the output per factory is $142 more than in 1889. This improvement is chiefly owing to the increase in the average number of cows per factory, which is 24 more than in the previous year, 373 being given as the average for the province. In examining the figures by groups it will be seen that the West Midland counties continue to lead in the amount of business done in the average factory, although the average number of patrons, which is 74, is less by 10 than in the Lake Huron group. The least number of patrons for any group is 41, the record given for the St. Lawrence and Ottawa counties, but three out of every seven factories in the province are to be found in this district. In every group excepting the Lake Erie and Georgian Bay an increase is observed in the quantity of milk required to make a pound of cheese. In the East Midland group it takes only 10.30 lb. of milk to make a pound of cheese, while in the Lake Huron district 10.75 lb. of milk are required. Every group shows a reduction in the value per 100 lb. of cheese, there being 42 cents difference in the figures for 1890 in the East Midland district compared with the previous year, and a falling off of 40 cents in the Lake Ontario group. The make of the West Midland counties averaged the best price, viz., $9.18 per 100 lb., while that of the Georgian Bay group brought only $8.91. Although the figures given for the province show the average date of opening to be the same for the three periods given, and the date of closing is but one later than in 1889, the figures in the various groups show a considerable diversity compared with each other, and some of the groups show complete change of dates compared with their respective records in the previous year. The date of opening in the Lake Erie group averaged four days earlier and the date of closing four days later than in the preceding year. In the Lake Huron counties the opening averaged one day earlier and eight days later than in 1889. In the Georgian Bay district the date of opening was very late, being on the 21st of May, ten days later than in 1889, but it closed two days later. Comparatively little change was made in the length of season in the other groups. The factories in the West Midland group were at work for the longest period, the average opening being May 1 and the closing November 8. The compilation of the returns by counties will be found in Table v.

BUTTER. The following table gives statistics by counties of 32 creameries reported out of 39 in operation in Ontario, showing the quantity and value of product (including cheese in five combination factories), the average number of patrons, the average price of butter per pound, and the dates of opening and closing :

Counties.	Creameries in operation.	Creameries making returns.	Butter.		Cheese.		Total value of product.	Average No. of patrons.	Average price of butter per lb.	Average date of opening.	Average date of closing.
			Quan.	Value.	Quan.	Value.					
	No.	No.	lb.	$	lb.	$	$		cts.		
Kent..........	1	1	9,203	1,841	....	....	1,841	29	20.00	Jun. 2	Sep. 27
Lambton	1	1	17,195	3,189	....	....	3,189	36	18.55	May 5	Oct. 31
Huron	4	3	69,800	13,580	....	....	13,580	257	19.46	" 21	" 19
Bruce	8	7	266.496	51,469	....	....	51,469	809	19.31	" 18	" 12
Grey	7	7	427,967	80,692	....	....	80,692	1,008	18.85	" 17	" 23
Middlesex	1	1	10,860	2,175	5,451	518	2,693	3	20.03	" 6	*
Perth	1	1	43,100	8,405	....	....	8,405	120	19.50	" 15	Nov. 8
Wellington	1	1	29,252	5,909	....	....	5,909	85	20.20	" 26	Oct. 4
Waterloo......	4	3	91,140	16,370	86,117	5,430	21,800	258	17.96	" 19	" 25
Durham.......	1	1	13,400	2,483	....	....	2,483	64	18.53	" 27	" 13
Prince Edward.	2	1	13,610	3,062	63,989	4,136	7,198	60	22.50	" 1	Nov. 1
Leeds and Grenville....	2	2	59,003	11,997	....	....	11,997	54	20.33	Apr. 26	" 30
Dundas	2	1	49,313	10,106	....	....	10,106	59	20.49	" 27	Oct. 31
Stormont......	1	1	39,816	8,123	135,609	8,610	16,733	76	20.40	May 1	Nov. 5
Glengarry	1	1	7,400	1,443	19,272	1,734	3,177	17	19.50	" 1	" 1
Other counties.	2	....	....	....	....	....	....	......	......	....	....
The Province:											
1890	39	32	1,147,555	220,844	310,438	20,428	241,272	2,935	19.24	....	....
1889	33	30	876,003	184,067	219,808	14,406	198,473	2,221	21.01	....	....

* Worked throughout the year. Reported to February 1st, 1891.

The number of creameries has been increased by 6. Of the 32 creameries returned 5 make both butter and cheese, one each in the counties of Middlesex, Waterloo, Prince Edward, Stormont and Glengarry. Only 3 were thus engaged in 1889. The output of butter from the 27 butter factories was 38,896 lb. per factory, as compared with 29,517 lb. in 1889, 26,592 lb. in 1888 and 34,250 lb. in 1887. The number of patrons increased from 74 per creamery in 1889 to 92 in 1890. The prices realised for butter averaged $1.77 per 100 lb. less than in 1889. More than 60 per cent. of the creamery butter is manufactured in the counties of Grey and Bruce. Of the creameries reporting, 7 state the quantity in pounds of cream gathered and 7 the quantity of milk gathered. The former use 1,693,168 lb. of cream in manufacturing 373,417 lb. of butter, valued at

$71,988. It thus required 4.53 lb. of cream per pound of buttter as compared with 4.14 in 1889, and 4.38 in 1888. In those creameries manufacturing from milk it took 25.24 lb. of milk for a pound of butter, as compared with 24.28 in 1889 and 24.9 in 1888. The average value of the product of 100 lb. of milk by this system was 79.6 cents (exclusive of the value of the buttermilk). The average from cheese factories was 86.0 cents. The average from the 5 combination cheese and butter factories was 90.2 cents. These factories used 4,433,003 lb. of milk, and made 97,346 lb. of butter, valued at $19,551, and 310,438 lb. of cheese valued at $20,428. By estimating the business of the 7 factories not returned, in the same proportion to the 27 butter factories reported, it will be found that the 39 creameries used 37,812,534 lb. of milk, or the product of 13,770 cows.

Ensilage. Correspondents report a very slow movement in the erection of silos. The idea seems to have met with the greatest favor in the Lake Ontario counties and in some of the counties along the St. Lawrence river, but even in these sections dairymen are moving cautiously. One correspondent in Dundas county states : "If the silos sprinkled over the township turn out well this year the practice of growing corn for ensilage is likely to become quite general next year." Another correspondent, however, claims that an objection to the silo is "the large amount of work it demands during a busy season of the year." Corn is the principal crop used for ensilage. Some correspondents report the silos as being remarkably successful, while one suggestively describes a neighboring silo as "smelling like a brewery."

THE APIARY.

The winter, according to the May reports, was favorable to the apiary, the losses resulting chiefly from stocks wintered inside finding the quarters too warm. Dysentery was reported by a few correspondents, and some colonies died from starvation, but taking the province over it was estimated that the losses would not average over eight per cent., and with experienced apiarists that percentage of losses would be further reduced. Western beekeepers appear to have been more successful than those in the east. The spring was rather backward for bees, and when correspondents wrote many colonies had not been out for a fly. Two cases of swarming in April were mentioned in Grimsby—an unusual occurrence.

The August bulletin had the following :—"Swarming was late as a rule, but in the majority of cases was quite frequent. Although occasional mention is made of spring dwindling and dysentery, very little is said about foul brood, and the general health of bees may be classed as good. There was a full supply of white clover, but linden was a failure owing to unpropitious weather at the time of bloom. The bees, however, found compensation in thistles and dandelions, which yielded considerable nectar. The average yield of honey per hive may be placed at 40 pounds, and in this matter eastern beekeepers appear to have been more favored than those in the west. The outlook for the apiary was fair, as correspondents wrote, although some were fearing the effects of the drouth then prevailing."

The November bulletin thus summed up the question of bees and honey :—"Very contradictory reports are given regarding the condition of the apiary. Some correspondents, in the Lake Ontario counties more particularly, speak of bees as in good condition and the yield of honey as a very fair one. The general experience, however, was that the fall was too wet and cold for the gathering of a full supply of nectar, and that bees could do but little more than hold their own in the latter part of the season. The result is that unskilled apiarists will find themselves with empty stores and weak colonies, which mean feeding back and doubling up, or annihilation. The net yields per colony, spring count, vary from nothing at all up to 200—the latter an exceptional case in Welland—but the average may be placed at about 40 lb. No disease is reported."

FACTORIES AND CREAMERIES IN ONTARIO.

CHEESE FACTORIES IN OPERATION IN ONTARIO DURING 1890, WITH NAME AND POST OFFICE ADDRESS OF THE SECRETARY OF EACH FACTORY.

NOTE.—No return received from factory marked with asterisk (*).

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
ESSEX:			
Mersea	Blytheswood	C. W. Hind, Prop.	Blytheswood.
KENT:			
Camden	Dawn Mills	J. T. Race, Prop.	Dawn Mills.
	*Thamesville	James Secord, Sec.	Thamesville.
Chatham	*Chatham Centre	T. McKerrell, Sec.	Eberts.
	Chatham Gore	David McArthur, Pres.	Tupperville.
	Sydenham Valley	J. N. McCoy	Wallaceburg.
Harwich	*Creek Road	John Buller	Harwich.
Howard	Botany	D. A. Graves, Sec.	Botany.
	*Buller's	James Buller, Prop.	Selton.
Orford	Orford Cheese Mfg. Co.	S. McDonald, Sec.	Muirkirk.
Raleigh	*Scaman's	Wm. S. Scaman	Charing Cross.
Tilbury East	Valetta	J. M. Hyde	Valetta.
ELGIN:			
Aldborough	Crinan	W. H. McLean	Crinan.
	*Rodney	Wm. Johnston, Prop.	Rodney.
	Rosedale	Arch. McColl, Sec.	Aldborough.
	West Lorne	John F. Taylor, Sec.	West Lorne.
Bayham	Bayham	E. T. Martin, Sec.	Griffin's Corners.
	Bayham Br. (Brownsville)	Benj. Hopkins, Sec.-Treas.	Brownsville.
	Bayham and Malahide	John L. Brown, Sec.	Corinth.
	New England	O. E. Twiss, Sec.	Tilsonburg.
	*Novia Scotia St	Miss J. Saxton, Sec.	Lakeview.
	Guysborough	George Bennett, Sec.	Guysborough.
	Vienna	J. T. Gamble, Sec.	Vienna.
Dorchester S.	Avon	Wm. Dafoe, Sec.	Avon.
	Lyons	Thos. Wilkinson, Sec.	Lyons.
	Springfield	John Clunas, Sec.	Springfield.
Dunwich	Dutton	W. A. Ostrander, Prop.	Dutton. Box 217.
	Wallacetown	A. Keilor	Wallacetown.
Malahide	Dunboyne	Noble F. Tufford, Sec.	Dunboyne.
	Malahide	R. Abell	Seville.
	Northwood	George Beckett, Sec.	Aylmer.
Southwold	Iona Station	McCallum Bros, Props.	Iona Station.
	Fingal	Thos. E. McLaughlin, Sec.	Fingal.
	Payne's Mills	Wm. Sharon, Sec.	Frome.
	West Magdala	R. R. Cranston, Prop.	West Magdala.
Yarmouth	Elgin	J. W. Scott, Prop.	Sparta.
	Mapleton	A. Charlton	Mapleton.
	*Springwater	Asa Pound, Prop.	New Sarum.
	Yarmouth Centre	James Brown, Sec.	YarmouthCentre.
NORFOLK:			
Charlotteville	St. Williams	G. W. Newman, Sec.	St. Williams.
	Vittoria	John Pow, Sec.	Vittoria.
	Walsh	Walter Rollings, Sec.	Walsh.
Houghton	*Clear Creek	James Slater	Clear Creek.
	Houghton Centre	S. T. Jackson, Prop.	Houghton.
Middleton	Courtland	O. E. Twiss, Sec.	Tilsonburg.
	Delhi	G. R. Gray, Sec.	Delhi. Box 115.
Townsend	Bloomsburg	J. H. Lingwood, Sec.	Bloomsburg.
	Boston	W. A. McIntosh, Sec.	Boston.
	Rockford, Villa Nova	H. W. Foster, Sec.	Villa Nova.
	Waterford	John Martin	Waterford.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
NORFOLK—*Con.*			
Walsingham	*Carholme	James Knowles, Sec.	Carholme.
	Lynedoch	C. A. Ostrander, Prop.	Lynedoch.
	Marston	C. H. Brayley, Sec.	Marston.
Windham	Bookton	Norman McCurdy, Sec.	Bookton.
	Nixon	W. S. Wood, Sec.	Nixon.
	Ranelagh	G. A. Carter, Sec.	Ranelagh.
	Vanessa	W. J. Reavely	Vanessa.
Woodhouse	Black Creek	W. C. Parsons, Prop.	Jarvis.
	Excelsior	W. H. Olds, Sec.	Simcoe.
	*Lynn Valley	E. G. Ford, Prop.	Lynn Valley.
HALDIMAND:			
Canborough	Attercliffe Sta.	Harold Eagle, Sec.	Attercliffe Sta.
	Canborough	James N. Paget, Prop.	Canborough.
Cayuga N.	*Kohler	John J. Lint, Sec.	Kohler.
Dunn	Lake View	F. Splatt, Prop.	Dunnville.
Moulton	*Stromness	Arch. McDonald	Stromness.
Rainham	Selkirk	Joel Hoover	Selkirk.
Seneca	Tyneside	J. M. Clysdale, Prop.	Tyneside.
Walpole	Cheapside	R. A. Walter, Sec.	Cheapside.
	Jarvis West	W. C. Parsons, Prop.	Jarvis.
	Springvale	John Hainer, Treas.	Springvale.
	Walpole	John W. Bain, Prop.	Cheapside.
WELLAND:			
Bertie	*Bertie	E. O. Disher, Sec	Ridgeway.
Wainfleet	Forks Road	John G. Wills, Sec	Forks Road.
	*Wellandport	Hamilton Johnson	Wellandport.
LAMBTON:			
Bosanquet	Ridge Tree	Alexander Jamieson, Sec.	Thedford.
Brooke	Aberfeldy	John J. Risk, Prop	Aberfeldy.
	Alvinston	R. J. Ward, Prop.	Alvinston.
	Brooke and Warwick	Alex. Cowan, Sec	Watford.
	Walnut	W. G. Willoughby, Prop.	Walnut.
Euphemia	*Annett's	John J. Risk, Prop	Aberfeldy.
	*Florence	J. W. Healy	Florence.
Plympton	Forest	Nicholas Hanning	Forest.
	*Gala Bank	Wm. Symington, Prop	Camlachie.
	South Plympton	A. D. Anderson, Sec	Wyoming.
	*Uttoxeter	Edward Archer, Sec	Warwick West.
Sarnia	*Vyner	Miles Carrick, Sec	Mandaumin.
Sombra	Sombra Cheese Co.	W. S. Howell, Sec.	Thornyhurst.
Warwick	*Maple Grove	B. Bachelor, Sec	Birnam.
	Thompson	Wm. Thompson	Arkona.
	Warwick	J. S. Clark, Prop	Warwick West.
HURON:			
Grey	Ethel	Robert Barr, jr., Prop	Ethel.
	Grey and Morris	Daniel Stewart, Sec	Brussels.
	Molesworth	Henry Coghlin, Sec	Molesworth.
	Walton	R. H. Ferguson, Sec	Walton.
Howick	Fordwich	James Fallis, Sec	Newbridge.
	Peoples	Wm. McKercher, Sec	Wroxeter.
	Springbank	George Padfield, Sec	Gorrie.
Hullett	Constance	R. Jamieson, Sec	Seaforth.
McKillop	Winthrop	John C. Morrison, Sec	Winthrop.
Stanley	*Blake	Asa J. Styles, Sec	Blake.
Stephen	Centralia	R. F. Hicks	Centralia.
	Corbett	Miss M. A. Corbett, Sec	Corbett.
	Crediton	Charles Brown	Crediton.
Tuckersmith	Rodgerville	James Murray, Sec	Rodgerville.
Turnberry	Bluevale	John Burgess, Sec	Bluevale.
Wawanosh E.	Belgrave	George Hood, Sec	Sunshine.
BRUCE:			
Amabel	Wiarton	Geo. H. Johnson, Sec	Wiarton.
Arran	Tara	John Douglas, Sec	Tara.
Brant	Brant	Daniel Sullivan, Sec	Malcolm.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
BRUCE—*Con.*			
Brant	Dunkeld	Thos. A. Chisholm, Sec	Dunkeld.
Bruce	Climax	Andrew Kirkconnell, Pres	Tiverton.
	Underwood	Amos Hilker, Sec	Underwood.
Carrick	Belmore	D. M. McDonald, Sec	Belmore.
	Otter Creek	Louis Braun, Sec	Walkerton.
Culross	*Riversdale	J. Lochart	Riversdale.
Elderslie	Elderslie	Isaac McClure, Sec	Williscroft.
Greenock	*Pinkerton	D. Pinkerton	Pinkerton.
Huron	Huron	James Harrison, Pres	Kincardine.
	*Paramount	Joseph Taylor, Sec	Lucknow.
	Pine River	John Thompson, jr	Pine River.
Kincardine	Armow	Wm. A. Shier, Sec	Armow.
	*Bervie	James Glass	Bervie.
	Glammis	W. M. Alton	Tiverton.
	Millarton	Wm. Rutledge, Sec	Millarton.
Kinloss	Holyrood	George McIntosh, Sec	Holyrood.
	Lucknow	J. A. Denning, Prop	Lucknow.
Saugeen	Burgoyne	T. B. Millar	Burgoyne.
	Star	George S. Webb, Prop	North Bruce.
GREY:			
Artemesia	Flesherton	James Brodie, Sec	Vandeleur.
	Markdale	Henry D. Irwin, Sec	Markdale.
Bentinck	*Hanover Ch. Co.	Andrew Magwood	Hanover.
Holland	Chatsworth	W. A. Ferguson, Sec	Chatsworth.
Normanby	Alsfeldt Ch. & B. Co.	C. H. Peterson, Sec	Clifford.
	Mount Forest	Joseph Tuck, Sec	Mount Forest.
	Varney	Chas. Ramage, Sec	Varney.
Osprey	Badjeros	George Bailey, Treas	Shrigley.
Proton	Dundalk	Robert Russell	Dundalk.
	Ventry	James Cavanagh, Sec	Hopeville.
	Victoria	Wm. Haines, Prop	Inistioge.
SIMCOE:			
Flos	Elmvale	Wm. Harvey, Sec	Elmvale.
Nottawasaga	Avening	W. G. Carruthers, Sec	Avening.
	Glen Huron	James Connor, Sec	Glen Huron.
	Lavender	Samuel Flach, Mgr	Lavender.
Tecumseth	Cookstown	W. F. Moore, Sec	Cookstown.
Tiny	*Lafontaine	Lecamp & Tremeer, Dirs.	Randolph.
MIDDLESEX:			
Adelaide	Kerwood	A. McKenzie, Sec	Kerwood.
	Keyser	Hugh E. Wilson, Prop	Keyser.
	*Victoria	Wm. Dowding	Adelaide.
Biddulph	Cedar Vale	Michael Blake, Sec	Elginfield.
	North Middlesex	George W. Fox, Sec	Lucan.
Caradoc	Caradoc	Wm. E. Sawyer, Sec	Mount Brydges.
	Mount Carmel	D. Leitch, Sec	Strathroy.
	Muncey Road	John Stuart, Sec	Mount Brydges.
Delaware	Delaware	H. J. Smith, Sec	Lambeth.
Dorchester N.	Burnside	S. Barr, Sec	Mossley.
	*Dorchester Station	L. D. Monk	Dorchester Sta.
	Gladstone	W. H. Swales, Sec	Gladstone.
	Gore	James Smith, Mfr	Crampton.
	Harrietsville	F. Kunz, Sec	Harrietsville.
	Thames	J. A. James, Mfr.	Nilestown.
Ekfrid	Appin	Hector McFarlane, Sec	Glencoe.
	Mayfair	John Cooper, Sec	Melbourne.
London	*Birr	Chas. Robson, Sec	Birr.
	Bryanston, Devizes	Robert Elliott, Sec	Plover Mills.
	Geary	John Geary, Prop	London, Box 132.
	Melrose	W. Ferguson	Ferguson.
	North Branch	Fred Bailey, Sec	Rebecca.
	Proof Line	James Tier, Sec	Arva.
	Union Hill	R. H. Harding, Sec	Thorndale.
McGillivray	West McGillivray	W. T. Amos, Sec	Lieury.
Metcalfe	Napier	Wm. Ormerod, Mfr	Napier.
	Sifton's	Thos. H. Payne, Sec	Cairngorm.
Mossa	Glencoe	Hector McFarlane, Sec	Glencoe.
Nissouri W.	Blanshard and Nissouri	Fergus McMaster, Sec	St. Marys.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
MIDDLESEX.—*Con.*			
Nissouri W.	Cherry Hill	Hope Webster, Sec	Thamesford.
	Nissouri West	W. Lee, Sec	Thorndale.
Westminster	Belmont	George McKellar, Sec	Belmont.
	Glanworth	R. G. Rose, Sec	Hubrey.
	North Street	H. B. Stephens, Prop	Glanworth.
	*Pond Mills	John McDougal	Lambeth.
	Westminster	A. E. Carrothers, Sec	Pond Mills.
	White Oak	John H. Burnard, Sec	White Oak.
Williams W.	Rob Roy, Parkhill	Wm. Dickson, Sec	Parkhill.
OXFORD:			
Blandford	Bright	John Riesberry, Pres	Bright.
	Eastwood	W. E. Hopkins, Sec	Eastwood.
Blenheim	Soho Ch. & B. Co	J. D. Scott, Sec	Richwood.
Dereham	Brownsville, Culloden, Tilsonburg	Benjamin Hopkins, Sec	Brownsville.
	Dereham and Norwich	Wm. Jones, Sec	Mount Elgin.
	Dereham and W. Oxford	A. R. McNiven, Sec	Ingersoll.
	Lawson's, Salford	J. P. Harris, Sec	Holbrook.
	Mount Elgin	James V. Bodwell, Sec	Mount Elgin.
	*Prouse's	Thos. Prouse, Prop	do
	Verschoyle	James Hunter, Sec	Verschoyle.
	Wilkinson's	J. H. Wilkinson	do
Nissouri E.	Kintore	D. R. Calder, Sec	Kintore.
	Kintore (East branch)	Thos. W. Alderson, Sec	do
	Lakeside	Robert Marshall	Lakeside.
	Murray Bros	W. C. Murray, Sec	St. Marys.
	*Nissouri	G. A. Sutherland, Sec	Ingersoll.
	Thamesford	David Lawrence, Sec	Thamesford.
Norwich N.	Dunkin's	T. L. Duncan, Sec	Norwich.
	Ontario, Burgesville	I. L. Farrington, Prop	do
	*Smith's	Robert Snell, Sec	do
Norwich S.	Springford	F. C. Anstice, Sec	Springford.
	Summerville	J. B. Addison	Otterville.
Oxford E.	Diamond	J. McConnell	Vandecar.
	Oxford	I. L. Farrington, Prop	Norwich.
	Oxford, East and West	M. S. Schell, Sec	Woodstock.
Oxford N.	Maple Leaf	Thos. Caddey, Prop	Ingersoll.
	Oxford, North	W. H. Sutherland, Sec	Ingersoll (Box111)
Oxford W.	Harris Street	C. E. Cook	Ingersoll.
	Oxford, West	W. G. Francis, Sec	Ingersoll.
Zorra E.	Blandford and Zorra E.	A. Miller, Sec	Walmer.
	German Union	Christian Schrag, Mfr	New Hamburg.
	*Honey Grove	Robert Morton, Prop	Cassel.
	Spring Creek	A. McKay, Sec	Woodstock.
	Strathallan	Absalom Glaves, Sec	Hickson.
	Zorra East Central	Douglas Bruce, Sec	South Zorra.
Zorra W.	Brooksdale	Wm. Matheson, Sec	Brooksdale.
	Cold Springs	Hugh Matheson, Sec	Youngsville.
	Red Star	W. H. Sutherland, Sec	Ingersoll.
	Zorra, West	Wm. Loveys, Sec	Embro.
BRANT:			
Brantford	N. Brant Dairy Ass	Thos. A. Good, Sec	Brantford.
	*Riverside	Robert Sanderson	do
Burford	Cathcart	Chas. Kelly, Sec	Cathcart.
	Harley	I. L. Farrington, Prop.	Norwich.
	Kelvin	Joseph McCombs, Sec	Kelvin.
	*New Durham	James Paterson, Sec	New Durham.
Dumfries S.	St. George	John Richardson, Prop	St. George.
Oakland	Oakland	George Taylor	Oakland.
PERTH:			
Blanshard	Blanshard	George B. Webster, Sec	St. Marys.
Downie	Avonbank	Wm. Tier	Motherwell.
	Black Creek	Thos. Ballantyne, M.P.P	Stratford.
	Downie	H. A. Southwick, Prop	Avonton.
	Gore of Downie	John Dempsey, Prop	Fairview.
	*Kastnerville	Geo. Barthel, Prop	Stratford.
Easthope N.	Avondale	John Wilford, Prop	Shakespeare.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory	Name of Secretary or other Officer.	Post Office Address.
PERTH—*Con.*			
Easthope S.	*Tavistock	Wm. Gillard	Tavistock.
Ellice	Classic	D. A. Dempsey, Prop.	Stratford.
	Ellice	Chas. Stock	Stratford.
Elma	Britton	Wm. Stevenson	Britton.
	Donegal	Samuel McAllister, Prop.	Donegal.
	Elma	Wm. Lochhead, Sec.	Atwood.
	Elmbank	Robert Cleland, Prop.	Listowel.
	Gotham	Joseph Freeman, Sec	Britton.
	Monkton	Andrew Erskine, Sec	Monkton.
	Newry	John Morrison, Sec	Newry.
	Silver Corners	Geo. Richmond, Sec	do.
	Trowbridge	John Adams, Sec	Trowbridge.
Fullarton	Cold Creek	Thomas Stacey, Sec	Fullarton.
Logan	*Willow Grove	James Wood	Bornholm.
Mornington	*Milverton	H. Goodhand, Prop	Milverton.
	Newton, Carthage	Hugh Jack, Sec.	Newton.
Wallace	Cedar Grove	George V. Pool, Sec	Wallace.
	Wallace	Jeptha Vankleeck, Sec	Listowel.
WELLINGTON:			
Arthur	Conn	James McLuhan, Sec	Conn.
	Kenilworth	George Cushing, Sec	Kenilworth.
Luther W.	Arthur and Luther	John McNab, Sec	Arthur.
Maryborough	Maryborough	Wm. Wilson, Sec	Rothsay.
	Riverbank	A. R. McLachlan, Sec	do.
	Wyandotte	Thos. J. Paterson, Sec	Moorefield.
Minto	Harriston	W. D. McLellan, Sec	Harriston.
	Minto and Arthur	James Wiseman, Sec	Cotswold.
	*Palmerston	George Garbig, Sec	Palmerston.
Peel	Goldstone	W. T. Whale, Sec	Gladstone.
	Peel	John Hought, Sec	Glenallan.
WATERLOO:			
Dumfries N.	Galt	W. P. Clay, Prop	Galt.
Wellesley	Bamberg	Jacob Kaufman, Sec	Bamberg.
	Honey Grove	J. W. Chambers, Prop.	Poole.
Wilmot	*Oak Grove	C. Schrag, Mfr.	New Hamburg.
	Philipsburg	John D. Schantz, Prop.	Baden.
DUFFERIN:			
Amaranth	Laurel	Jonathan Varcoe, Sec	Laurel.
	Waldemar	John Johnston, Treas	Waldemar.
Melancthon	Shelburne	Jacob Walker, Treas	Shelburne.
LINCOLN:			
Caistor	Caistorville	Adam Spears, Sec	Caistorville.
Clinton	*Beamsville	Arthur Hunter	Beamsville.
	Campden	H. S. Hummel, Sec	Campden.
Gainsborough	Bismarck	John L. Heaslip, Sec	Wellandport.
WENTWORTH:			
Ancaster	Renforth	D. Hamilton, Sec	Renforth.
Beverley	Beverly	George Paterson, Prop.	West Flamboro.
	*Sheffield	C. W. Laing, Prop	Sheffield.
PEEL:			
Chinguacousy	Norval	Robert Groat, Prop	Georgetown.
YORK:			
King	Eversley	Henry Rogers, Sec	Eversley.
Markham	Cedar Grove	Mrs. J. N. Raymer, Mfr.	Box Grove.
	Ringwood	A. B. Grove	Ringwood.
ONTARIO:			
Whitby E	Geneva	James Burns, Prop.	Columbus.
DURHAM:			
Cavan	Millbrook	James Brock, Sec	Millbrook.
Clarke	Newtonville	W. J. Jones	Clarke.
Darlington	Darlington	L. M. Courtice, Salesman	Courtice.
	Hampton	F. L. Ellis, Sec	Hampton.
Hope	Hope	Wm. Henwood, Sec	Welcome.
	Perrytown	Fred. Currelley, Sec	Canton.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
NORTHUMBERLAND:			
Alnwick	Roseneath	Dennis Keogan, Sec	Hastings.
Brighton	Brighton and Murray	Isaac W. Hennessey, Sec	Wooler.
	Cedar Hill	Hugh Strong, Prop	Hilton.
	*Codrington	A. D. Richards, Pres	Codrington.
	Hilton	A. E. Thorne, Sec	Hilton.
	Standard	John Armstrong, Pres	Warkworth.
Cramahe	Castleton	R. R. Philp, Pres	Castleton.
	Cramahe	R. A. Brintnall, Treas	Dundonald.
	Morganston	Homer Platt, Sec	Morganston.
	Salem	S. E. Dixon	Colborne.
Haldimand	Eddystone	George Gillespie, Sec	Vernonville.
	Spring Valley	A. G. McDonald, Prop	Burnley.
	Wicklow	R. J. Rutherford, Sec	Wicklow.
Hamilton	Baltimore, Crown	Samuel Philp, Prop	Baltimore.
	*North Star	John C. Rosevear, Pres	Cold Springs.
Monaghan S	Bensfort	Thomas Dodds, Sec	Bensfort.
Murray	Fountain	Richard Buck	Frankford.
	*Maple Leaf, B	C. W. Wright, Sec	do
	Queen's	W. A. Hendrick, Pres	Stockdale.
	Smithfield	W. H. Potts, Sec	Smithfield.
Percy	Brickley	A. B. German, Sec	Brickley.
	Model	James Oliver, Sec	Warkworth.
	Warkworth	W. T. Wiggins, Sec	do
Seymour	Brae	Gilbert Bedford, Sec	Campbellford.
	Crow Bay	James C. Cleugh, Pres	Sarginson.
	Empire	Robert White, Pres	Campbellford.
	Forest	Alex. Haig, Sec	Menie.
	*I. X. L	John Govan, Pres	Campbellford.
	Meyersburg	Wm. Clark, Sec	Meyersburg.
	Prince of Wales, Valley	John Clark, Sec	Campbellford.
	Rylestone	Arch. Morton, Pres	Springbrook.
	Seymour West	E. C. West, Sec	Campbellford.
	Stanwood	James B. Peoples, Sec	Preneveau.
	Woodland	F. Macoun, Sec	Campbellford.
PRINCE EDWARD:			
Ameliasburg	Brandy Creek	R. N. Hunt, Pres	Murray.
	Mountain View	A. J. Potter, Prop	Mountain View.
	Rednerville	John G. Peck, Pres	Albury.
Athol	Cherry Valley	Luther Platt, Sec	Cherry Valley.
Hallowell	Bloomfield	David S. Hubbs, Sec	Bloomfield.
Hillier	Hillier	Louis P. Hubbs, Sec	Hillier.
Marysburg N	Lake View	G. N. Rose, Sec	Waupoos.
	Union	Robert Davison, Sec	Picton.
Marysburg S	Black Creek	Wm. Call, Sec	Milford.
	Point Traverse	Alva Rose, Sec	South Bay.
	*Royal Street	Walter Striker, Prop	Milford.
Sophiasburg	Ben Gill	Thomas Wright, Sec	Gilbert's Mills.
	*Big Island	Ryerson Rankin	Demorestville.
	*Elm Brook	Mrs. Richard Benson	Picton.
	*Grape Vale	James Roblin	Fish Lake.
	Maple Leaf	Alfred Foster	do
	Northport	Ira David, Pres	Solmesville.
LENNOX AND ADDINGTON:			
Adolphustown	*Adolphustown	Percival Platt	Dorland.
Camden	Camden East	George E. Hinch, Sec	Camden East.
	Centreville	Wm. Whelan, Treas	Centreville.
	Enterprise, Whitman Creek	James Cousins, Auditor	Enterprise.
	Moscow	Vanluven Bros., Props	Moscow.
	Newburgh	George A. Aylesworth, Sec	Newburgh.
Ernesttown	Bath, Union	W. R. Gordanier, Sec	Morven.
	*Empey	P. E. R. Miller, Sec	Switzerville.
	Metzler	L. L. Gallagher, Sec	Wilton.
	Odessa	James C. Fraser, Sec	Odessa.
Fredericksburg N	Napanee	W. N. Dollar, Sec	Napanee.
	Phœnix	Charles B. Parks, Sec	Hay Bay.
Fredericksburh S	Phippen's	Wm. Phippen, Prop	Sandhurst.
	Sillsville	James Rennie	Sillsville.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
LENNOX AND AD.—*Con.*			
Kaladar	Flinton	Thomas Welsh, Mfr	Flinton.
Richmond	Forest Mills	W. J. Sergeant, Sec	Kingsford.
	Selby	Ira B. Hudgins, Sec	Selby.
Sheffield	Clareview	John Garrett, Sec	Erinsville.
	Sheffield	D. E. Rose, Sec	Tamworth.
FRONTENAC:			
Bedford	Fermoy, Salem	John McGuire, Sec	Westport.
	Tichborne	Joseph Kenny, Prop	Tichborne.
Hinchinbrooke	Iron Junction	Joseph Kennedy	Godfrey.
	Parham	David Goodfellow	Parham.
Kennebec	*Arden	W. B. Mills	Arden.
Kingston	*Arigan	Patrick Black	Mt. Chesney.
	*Glenburnie	Robert Vair, Prop	Glenburnie.
	*Glenvale	J. Creamer	Glenvale.
	*Lake Shore	P. E. Ward	Kingston.
	Maple Grove	F. P. Grass, Prop	do
	Pious Hollow	T. A. Keenan, Prop	Mt. Chesney.
	Union	Joshua Knight	Elginburg.
Loughborough	*Forest	John Moreland, Sec	Sydenham.
	Railton	Keely & McAuley	Railton.
Oso	Crow Lake	H. W. Hunt, Sec	Sharbot Lake.
	Perth Road	Wm. Guthrie, Sec	Perth Road.
Pittsburg	Granite Hill	F. J. Henderson, Sec	Pittsferry.
	Keenan & Sons	T. A. Keenan	Mt. Chesney.
	Leo Lake	John P. Bower	Seeley's Bay.
	*Maple Leaf	Thomas Bell	Birmingham.
	Morning Star	Daniel McLean	Eric.
	*Pine Grove	John Dillon	Brewer's Mills.
	Pine Hill	D. Trotter, Sec	Cushendall.
	Rose Hill	James R. Barnes, Sec	Dufferin.
	Woodburn	David Rea	Willetsholme.
Portland	Bellrock	Vanluven Bros., Props	Moscow.
	*Bradshaw	Robert McLean, Sec	Harrowsmith.
	Hartington	Thomas Leonard, Sec	Hartington.
	Verona	Howard Reynolds, Prop	Verona.
Storrington	*Battersea	W. J. Anglin	Battersea.
	*Cold Springs	C. W. Langwith, Sec	Sunbury.
	Duff's	Alexander Ritchie, Sec	Inverary.
	Excelsior	J. L. Keelor, Prop	Battersea.
	*Lake Opinicon	Adam Barr	Inverary.
	Sand Hill	W. W. Sands, Sec	Sunbury.
	*Storrington	L. W. Murphy	Brewer's Mills.
	Sunbury	Gordon Waldron, Sec	Sunbury.
	Washburn	Henry McBroom	Washburn.
Wolfe Island	St. Lawrence	Rattray & Kenny, Props	Wolfe Island.
LEEDS AND GRENVILLE:			
Augusta	Charleville, Grenville, Domville, Central Augusta	J. W. Place, Sec	Prescott.
	*Maple Grove	F. K. Wright, Sec	Algonquin.
	North Augusta	George Neeley	North Augusta.
	Roebuck	James Keating, Sec	Roebuck.
	*St. Lawrence Star	John McLean	Maitland.
	South Branch, Throoptown	Frank Meech, Sec	North Augusta.
	*Victory, No. 1	John S. Ralph	North Augusta.
	Willow	Andrew McNish, Sec	Brockville.
Bastard and Burgess S.	Bresee's	M. F. Bresee, Sec	Philipsville.
	Clear Spring	Alex. Murphy, Sec	Portland.
	Grand Central	E. Bowser, Sec	Delta.
	Myers'	Thomas Myers, Prop	Forfar.
	People's Mutual	Thomas G. Morris	do.
	Philipsville	L. N. Phelps, Sec	Philipsville.
	Plum Hollow	Andrew Derbyshire, Sec	Plum Hollow.
	Poole's	Wm. N. Poole, Mfr	Freeland.
	Reliable	Rogers & Co., Prop	Newboyne.
	Smith's Valley	R. A. Sheldon, Sec	Harlem.
Crosby N.	Ardmore, Westport	John McGuire, Sec	Westport.
	Centreville, Model	T. C. Singleton, Prop	Newboro'.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
LEEDS AND GREN.—*Con.*			
Crosby S	Clear Lake Union	George Leggett	Singleton.
	Dominion	E. V. Halladay, Prop	Elgin.
	Maple Grove	S. M. Halladay, Mfr.	do.
	Morton	R. H. Somerville, Mfr	Morton.
	Rockdale, Elgin Model	J. R. Dargavel, Sec	Elgin.
	Singleton	T. C. Singleton, Prop	Newboro'.
Edwardsburg	Cardinal	Alex. Smith, Sec.	Cardinal.
	Glensmail, (Eager's)	R. J. Bennett, Sec.	Glensmail.
	Johnstown, (Eager's)	L. Rooney, Sec	Prescott.
	Lime Kiln	Wm. Gore, Sec	do.
	Mainsville	William Eager, Prop	Morrisburg.
	Millar's, Nos. 1, 2 and 3	Millar & Ferguson, Props	Spencerville.
	Shanley, (Eager's)	George Anderson, Sec.	Shanley.
	*Thompson's, No. 1	W. H. Thompson, Prop	Prescott.
	Thompson's, No. 4	A. D. VanCamp, Sec.	do.
Elizabethtown	Anvern	A. C. Johns, Prop	Fairfield, East.
	Barlow	C. L. McCready, Sec	Addison.
	*Excelsior	R. McNish	Brockville.
	Glen Buell	C. J. Gilroy, Sec	Glen Buell.
	*Leeds Union	L. Shipman, Sec.	Lyn.
	Maple Grange	Joshua Gilroy	do.
	Orchard Valley	James White, Prop	Jellyby.
	*Palace	Cyrenus Stowell, Sec.	Addison.
	Rockspring	W. C. Tackabery	Rockspring.
	Royal Dominion	T. W. Horton	New Dublin.
	*Smith's	Thomas Smith	Greenbush.
	*Star	M. K. Evertt, Prop	Easton's Corners.
Elmsley S	Lombardy	Michael O'Mara	Lombardy.
Gower S	Hickston	Wm. Eager, Prop	Morrisburg.
Kitley	Farmer's Choice	Fred W. Scovill	Athens.
	Farmer's Friend	Charles Rudd, Sec.	Frankville.
	Glen Elm	Hugh A. Hunter, Sec.	Smith's Falls.
	Newbliss	John Mackay, Sec.	Newbliss.
	*Robinson	Alex. Cameron.	Smith's Falls.
	Silver Creek	George S. Stratton, Sec	Toledo.
Leeds and Lansdowne.	Bay	Robert Wilson, Sec.	Wilstead.
	Birmingham's Cheddar	James Birmingham	South Lake.
	Bruce	James Keating, Sec.	Lansdowne.
	Cold Glen	J. Willoughby, Prop	Ellisville.
	Deerlick	John Cowan	Lansdowne.
	*Dulcemain	Wm. Sliter	Warburton.
	*Fairfax	John A. Heaslip	Sand Bay.
	Gananoque, Lorne	James Donevan, Sec.	Gananoque.
	*Gananoque Junction	John Conner.	do.
	Lake View	W. H. Pierce, Sec	Ellisville.
	Lyndhurst	Henry Green, Prop	Lyndhurst.
	Oak Leaf	M. J. Johnson, Treas	Oak Leaf.
	*Rapid Valley	C. A. Bradley	Lansdowne.
	St. Lawrence	George E. Godkin, Sec.	Waterton.
	Sand Bay	Benj. Herbison, Sec.	Sand Bay.
	Seeley's Bay	R. Gardiner, Prop	Seeley's Bay.
	Springvale	B. H. Brown, Sec	Morton.
	Tilley	James W. Grier, Sec.	Lansdowne.
	Warburton	John Cook, Sec	Warburton.
	Washburn	L. H. Washburn, Sec.	Soperton.
Oxford on Rideau.	Anderson's	John Anderson, Prop	Oxford Mills.
	Bishop's Mills	Albert Alexander, Sec.	Bishop's Mills.
	Brown's Bridge	Wm. Eager, Prop.	Morrisburg.
	Graham	Joseph Carson, Sec.	Millar's Corners.
	*Kemptville	Orlando Bush, Sec.	Kemptville.
	*Oxford Mills	Levi Patton, Sec.	Oxford Mills.
Wolford	Old Fairfield	Rufus Bissell, Sec.	Easton's Corners.
	Rideau Valley	John Kerr, Sec	Merrickville.
Yonge and Escott	Caintown	James White, Sec	Caintown.
	*Edgeley's	M. J. Connolly, Sec.	do.
	Elbe	Bates & Brown, Props	Elbe Mills.
	Escott Union	W. H. Warren, Sec	Rockfield.
	Farmersville	L. A. Brown, Prop	Athens.
	Holland	H. C. Lynch, Sec.	Escott.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretery or other Officer.	Post Office Address.
LEEDS AND GREN.—*Con.*			
Yonge and Escott	*Junetown, A.	James Herbison, Salesman	Caintown.
	Junetown, B.	Alvin Avery, Sec	do.
	Leeds County	Terrence Purvis, Sec.	Yonge Mills.
	Lillie Springs	R. W. Littlejohn, Pres.	Caintown.
	*Mallory's	A. W. Mallory	Mallorytown.
	*Mallorytown Union	David Forester, Sec.	do.
	Ronan's	J. K. Redmond, Sec	Athens.
	Springfield Union	N. E. Mallory, Sec.	Escott.
DUNDAS :			
Matilda	Advance, No. 2	Thomas Scott, Sec.	Glen Stewart.
	Dundela	John W. Cooper	Dundela.
	Farmer's	G. A. Burnside, Sec	Iroquois.
	Iroquois, Maple Grove	James McCullough, Prop	do.
	Model, No. 1	E. A. Roode, Prop	Hulbert.
	Morrisburg	Wm. Eager, Prop	Morrisburg.
	Morrisburg	C. E. Robertson, Sec	do.
	*Rowena, (Eager's)	R. M. Bouck, Sec	Irena.
	*Thompson's, No. 3	S. W. Wood	Dixon's Corners.
	*Thompson's, No. 6	W. H. Thompson, Prop	Prescott.
Mountain	*Advance, No. 1	Edward Scott, Prop	Heckston.
	Rose & Co., Nos. 1 and 3	John McTavish, Sec	VanCamp.
	South Mountain	Wm. Eager, Prop	Morrisburg.
Williamsburg	Archer	G. C. Tracy, Sec	Archer.
	Caughnawaga	Wm. Eager, Prop	Morrisburg.
	Dunbar	Isaiah Barkley	Dunbar.
	*East Williamsburg	C. D. Castleman	Morrisburg.
	*Elma, *Colquhoun *Glen Becker, *Grantley	John N. Logan	Elma.
	Hoasic	Thomas McDonald, Prop	Morrisburg.
	North Williamsburg	James Dickey, Sec	N. Williamsburg.
	Riverside, (Eager's)	B. H. Hayunga, Sec.	Morrisburg.
Winchester	Cassbridge Creamery	D. Halliday, Sec	Cassbridge.
	Chesterville	Thos. McDonald, Prop	Morrisburg.
	Chesterville, Connaught Ormond, Winch't'r Springs	Wm. Eager, Prop	do.
	Kendrick and Carlyle	W. R. Allison, Sec	Dunbar.
	*Morewood	John McCormick	Morewood.
	Rose & Co., No. 2	John McTavish, Sec	VanCamp.
	Union, (co-operative)	George Carlyle, Sec	Morewood.
STORMONT :			
Cornwall	Black River, Nos. 1, 2 and 3.	P. N. Tait, Prop	Mille Roches.
	*Cornwall Centre	A. E. Cline, Sec.	Eamer's Corners.
	Grant's Corners	Wm. Irvine, Prop	Cornwall.
	Mille Roches	P. N. Tait, Sec.	Mille Roches.
	Moulinette	D. J. McGilles, Sec	Moulinette.
	*Silmser's Corners	W. S. Friend, Sec	Cornwall.
Finch	Berwick, No. 1 and 2	James Small, Prop	Berwick.
	Cahore	Wm. Eager, Prop	Morrisburg.
	Crysler	F. Richards, Sec	Crysler.
	Goldfield Comb. (3)	C. H. Wood, Prop	Goldfield.
Osnabruck	*Dickenson Landing	Chas. S. Baker	Wales.
	Dixson	J. C. Stata, Sec	Lunenburg.
	Farran's Point	J. R. Farran, Sec	Farran's Point.
	Goldfield Comb. (3)	C. H. Wood, Prop	Goldfield.
	Lunenburg	H. McEwan, Sec.	Lunenburg.
	North Osnabruck	Gordon Baker	Osnabruck Centre
	White Clover	George H. Jackson, Sec	Gallingertown.
Roxborough	*Allangrove Comb. (2)	D. M. Macpherson, Prop	Lancaster.
	Berwick, No. 3	James Small, Prop	Berwick.
	Gravel Hill	O. Fulton, Salesman	Avonmore.
GLENGARRY :			
Charlottenburg	Allangrove Comb. (9)	D. M. Macpherson, Prop	Lancaster.
	Camerontown, Tyotown	Thos. McDonald, Prop	Morrisburg.
	Fraser's Point	D. A Fraser, Sec	South Lancaster.
	Martintown or Lilly White.	W. Irvine, Prop	Cornwall.
Kenyon	Allangrove Comb. (5)	D. M. Macpherson, Prop	Lancaster.
	*Greenfield	J. J. Cameron, Sec	Greenfield.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
GLENGARRY.—*Continued.*			
Lancaster	Allangrove Comb. (4)	D. M. Macpherson, Prop.	Lancaster.
	*Glen Norman, *Dalhousie Mills	James Irvine	Dalkeith.
	Pine Grove (Thistle Brand)	R. J. McArthur	N. Lancaster.
Lochiel	*Dalkeith, *McCormick, *McCrimmon	James Irvine	Dalkeith.
	E. Hawkesbury, No. 3	James Hurley, Sec	Barb.
	*Gauthier's Bridge	D. A. McDonald	Alexandria.
	*Spring Creek Comb. (7)	W. D. McLeod, Prop.	Kirkhill.
PRESCOTT:			
Alfred	Alfred	F. W. Langrell, Sec.	Alfred.
	Daoust	Gatien Parisien, Sec.	do.
	Dubois	Onesime Dubois	Lefaivre.
Caledonia	Molloy's	James Proudfoot, Sec.	Fenaghvale.
Hawkesbury	E. Hawkesbury, Nos. 1 & 2	James Hurley, Sec	Barb.
	Hawkesbury	W. H. Byers, Pres	Hawkesbury.
	Maple Leaf	J. C. McAlpine, Sec.	St. Ann du Prescott.
	Maple Leaf, No. 1	Amède Leroux	St. Eugene.
	Maple Leaf, No. 2	Joseph Seguin	Point Fortune.
	*Monolea, No. 1	James Ross	Little Rideau.
	*Monolea, No. 4	John W. Ross	do.
	*Spring Creek Comb. (7)	McCuaig, Cheney & Co. Props	Vankleek Hill.
	Spring Grove	S. N. Morrison, Prop.	Henry.
	Vankleek Hill	D. C. McKinnon	Vankleek Hill.
	*One factory	John McNish	do.
	* do.	Wm. Wyman	Chute à Blondeau.
	do.	Joseph Vachon, Prop.	Mongenais.
Longueuil	Cassburn	R. H. Marston, Sec.	Cassburn.
Plantagenet	Fournier	Stephen Surch, Sec.	Fournier.
	Pendleton	Henry Moffatt, Prop.	Pendleton.
	Riceville, Burnside	A. McLean, Sec	Riceville.
	St. Isidore	N. Parent, Prop	St. Isidore.
	Star	John McCrank, Sec.	Curran.
	Treadwell	A. H. Chessar, Sec	Plantagenet.
RUSSELL:			
Cambridge	Clarence	Damase Meilleur	Clarence.
	*St. Albert	Louis Genier	St. Albert.
Clarence	The Brook	Joseph Menard, Sec.	The Brook.
	The Lake	Dr. A. DesRosiers	Clarence Creek.
Cumberland	Russell, Nos. 1, 2 and 3	W. A. Munroe	Navan.
Russell	Felton	Wm. Eager, Prop.	Morrisburg.
	*Ridge, No. 1	D. McDiarmid	St. Onge.
CARLETON:			
Fitzroy	River View	John Stevenson, Prop.	Kinburn.
	Union Pride	John Tierney, Sec.	Arnprior.
Goulbourn	Golden	Henry Vaughan, Sec.	Stapledon.
	Ottawa Valley	Adam Abbott, Sec	Hazledean.
Gower N.	Kars	Wm. Eager, Prop.	Morrisburg.
Huntley	*North Gower *Carp	Edward Kidd, Prop	North Gower.
March	*Dunrobin	J. J. Younghusband, Sec.	Dunrobin.
Marlborough	*Burritt's Rapids	Edward Kidd, Prop.	North Gower.
Nepean Osgoode	Fallowfield Kenmore, Marvelville, Osgoode, Richmond	Wm. Eager, Prop.	Morrisburg.
	*Lorne	John Campbell	Dalmeny.
	*Manotick	Edward Kidd, Prop.	North Gower.
	Osgoode, No. 10	A. Walker, Sec.	Metcalfe.
	*Osgoode, No. 12	H. D. York.	do.
	*White Globe, No. 2	G. M. Donaldson	Vernon.
	White Globe, No. 3	John McCaul, Sec.	do.
RENFREW:			
Horton	Maple Home	Robert McLaren, Sec.	Renfrew.
Ross	Forester's Falls	Wm. Grant, Prop.	Forester's Falls.
Wilberforce	Rankin, Wilberforce	Thos. Leech, Prop.	Rankin.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
LANARK:			
Bathurst	*Bathurst	Thomas Radford	Elliott.
	*Fallbrook	Walter Cameron	Fallbrook.
	Harper	Joseph Warren, Sec.	Harper.
	Scotch Line	Samuel Wilson	Allan's Mills.
Beckwith	Beckwith	Thomas Nesbitt, Sec.	Carleton Place.
	Valley Queen	Peter McEwen, Sec.	Franktown.
Dalhousie	Watson's Corners, Brookside	W. A. Moore, Sec.	Perth.
Drummond	Balderson	Andrew Allan, Sec	Balderson.
	Dexter	Donald McPhail, Sec	McPhail.
	Drummond Centre	Wm. J. McCreary, Sec	Innisville.
	Mississippi, Riverside	C. A. Matheson, Sec	Perth.
Elmsley N.	Lone Star	B. S. Snider, Sec	Port Elmsley.
Lanark	Boyd's, No. 1	Alfred Hammond, Sec.	Innisville.
	Fairplay	Thomas Jackson, Sec	do.
	Hopetown	John Stewart, Sec.	Hopetown.
	Middleville	A. R. McIntyre, Sec.	Middleville.
Montague	Cedar Grove	Colin McNabb, Sec	Smith's Falls.
	Roseville	Hugh Clark, Sec.	Montague.
	Thompson's No. 7	Robert Eamer, Sec	Smith's Falls.
Pakenham	Pakenham	B. B. Dunnet	Pakenham.
Ramsay	Mississippi Pride	James Robertson, Sec	Almonte.
	Rosedale	Alfred James, Sec.	Clayton.
Sherbrooke S	Lake View	John McGuire, Sec	Westport
VICTORIA:			
Eldon	Kirkfield	S. Truman, Sec	Kirkfield.
	Lorneville	John A. Jackson, Sec	Lorneville.
Emily	Downeyville	J. C. Lucas	Downeyville.
Fenelon	Cambray	H. J. Lytle	Cambray.
	Fenelon Fal's	F. Sandford, Prop.	Fenelon Falls.
Mariposa	Little Britain	Owen Yearsley, Prop	Little Britain.
	Mariposa	David Rogers, Sec.	Linden Valley.
Ops	Reaboro'	J. A. Brown	Reaboro'.
Verulam	Bobcaygeon	I. L. Read, Sec	Bobcaygeon.
	Star	Mcrgan Johns, Sec	do.
PETERBOROUGH:			
Asphodel	*Norwood	Wm. Buck	Norwood.
	Ormond	James O'Reilly, Sec.	Hastings.
	Westwood	John Lancaster, Sec.	Westwood
Belmont.	Melrose Abbey	Samuel Elliott, Sec	Norwood.
	Round Lake	D. T. Young, Pres.	Rush Point
	Star	James B. Peoples, Sec.	Preneveau.
	Trentbridge	Wm. Johnston, Pres.	Trentbridge.
Douro	Maple Leaf	David Pilkey, Sec	Peterborough.
	Pine Grove	E. J. Abbott, Sec.	Lakefield.
Dummer	*South Dummer	S. S. Spence	Cottesloe.
	Warminster	S. R. Payne, Sec	Warsaw.
	Warsaw	Wm. F. Darling	do
Ennismore	*Myrtle	R. J. Scollard	Ennismore.
Otonabee	Keene	George Mather, Sec.	Keene.
	Otonabee Union	George Stewart, Sec.	Peterborough.
	Peterborough	Wm. Girvin, Sec	do.
	Shearer	John Miller, Sec.	Lang.
Smith	Central Smith	James Tindle, Sec.	Peterborough.
	Cherry Grove	P Robinson, Sec	Bridgenorth.
	Lakefield	J. W. Moore, Prop	Lakefield.
	Missing Link	James Middleton, Sec	Peterborcugh
	North Smith	M. E. Sanderson, Pres.	Selwyn.
HALIBURTON:			
Cardiff	Deer Lake	Alfred W. Willis, Sec	Deer Lake.
Dysart	Dysart	Edward Holmes	Haliburton.
	Haliburton	George Bemister, Sec	do.
Minden	*Minden	M. Brown, Sec	Minden.
Monmouth	*Monmouth	J. H. Anderson	Wilberfcrce.
Stanhope	Stanhope	Jospeh Beatty	Boskung.
HASTINGS:			
Carlow and Mayo	Carlow	Andrew Whyte, Sec.	Boulter.
	Carlow and Mayo Union	W. J. Douglas, Pres	Fort Stewart.

CHEESE FACTORIES IN ONTARIO.—*Continued.*

County and Township.	Name of Factory.	Name of Secretary or other Officer.	Post Office Address.
HASTINGS :—*Continued.*			
Dungannon	Bancroft	Fred. Mullett, Pres	Bancroft.
	L'Amable	J. R. Tait, Sec	L'Amable.
	Walkerville	D. Kavanagh, Pres	Umfraville.
Elzevir	Bridgewater, Elzevir	Wm. Wiggins, Pres	Queensborough.
Herschel	Maynooth	John M. Third, Sec	Maynooth.
Hungerford	Bogart	Peter Labarge, Pres	Bogart.
	*Cedar	Andrew Kirk	Chapman.
	Kervine	Patrick Murphy, Pres	Stoco.
	Marlbank	Wm. Burley, Sec	Marlbank.
	Moneymore	John Thompson, Sec	Moneymore.
	Roblin	James Clare, Pres	Chapman.
	Thomasburg	E. Elliott, Sec	Thomasburg.
	*Tweed	Thomas Graham, Pres	Tweed.
	Victoria	Robert Gordon, Pres	do.
Huntingdon	Beulah	Martin Baker, Pres	Ivanhoe.
	Daisy	John O'Reilly	Madoc.
	Glen	Samuel Ray, Pres	Fuller.
	Moira	W. H. Morton, Pres	Moira.
	*West Huntingdon	James Haggerty, Pres	West Huntingdon
	White Lake	Hector Wood, Pres	Ivanhoe.
Madoc	Allen Settlement	W. J. Allen, Pres	Cooper.
	Alexandria	John Caskey, Pres	Madoc.
	*Brook Valley	Thomas Burnside	do.
	Cold Spring	A. M. Ketcheson, Pres	do.
	Golden	James English, Pres	do.
	Spring Creek	Wm. Thompson, Pres	Remington.
Marmora	Spring Hill	D. McKenzie	Madoc.
	Deloro	Ralph Laycock, Pres	Deloro.
Monteagle	Marmora, Cook	Wm. Hilton, Pres	Marmora.
	Greenview	Mrs. Edward Leveck, Sec	Greenview.
	Hybla	George A. Bartlett, Pres	Hybla.
Rawdon	*Diamond	Alex. Johnston	Stirling.
	Enterprise	James W. Butler, Pres	Sine.
	Evergreen	Robert Lanigan, Pres	Stirling.
	Harold	John Tanner, Pres	Harold.
	Maple Leaf	Wm. Meiklejohn, Pres	Big Springs.
	Plum Grove	Thomas Walker, Pres	Wellman'sCorners
	Springbrook	Thomas J. Thompson, Pres	Springbrook.
	*Stirling	Hiram Conley, Pres	Stirling.
Sidney	Bay View	R. J. Graham, Sec	Belleville.
	Frankford	Joshua Anderson	Frankford.
	Front of Sidney	A. P. Meyers, Salesman	Trenton.
	Grove	A. B. Mallory, Pres	Frankford.
	Johnstown	E. Harry, Sec	Glen Miller.
	Shamrock	Oakley Vandervoort, Pres.	Stirling.
	Sidney	J. R. Brower, Pres.	Belleville.
	*Sidney Town Hall	S. T. Wilmott, Pres,	Wallbridge.
	Springfield	W. H. Knox, Pres	Trenton.
Thurlow	Ashley	Harford Ashley, Sec	Belleville.
	Bronk	James Boldrick, Pres	Canifton.
	East Hastings	W. A. Chapman, Sec	Roslin.
	Halloway	P. R. Daly, Pres	Foxboro'
	Thurlow	O. R. Weese, Pres	Belleville.
	Union	F. Brenton, Pres	Corbyville.
	Zion	Wm. Sills, Sec	Foxboro'.
Tyendinaga	Albert	Michael Corrigan, Pres	Albert.
	Gould's Cheddar	Peter Gould, Sec	Napanee.
	Melrose	A. J. McLaren	Melrose.
	Mountain	R. L. Lazier, Pres	Shannonville.
	Read	John D. Naphan	Naphan.
	Rosebud	Alex. Coulter, Sec	Myrehall.
	Shannonville	Wm. Clazie, Pres	Belleville.
Wollaston	Coe Hill	R. S. Tivy, Pres	Coe Hill.

CREAMERIES IN ONTARIO IN 1890.

County and Township.	Name of Creamery.	Name of Secretary or other Officer.	Post Office Address.
ESSEX :			
Mersea	*Leamington	Sloan & Bruner, Props	Leamington.
KENT :			
Raleigh	Cedar Springs	Taylor & Williamson	Cedar Springs.
LAMBTON :			
Plympton	Wanstead	Arch. Wark	Wanstead.
HURON :			
Goderich	Goderich (Town).	John Hannah, Prop	Seaforth.
Hullett	*Londesborough	George Watt, Pres	Londesborough.
McKillop	Seaforth (Town)	John Hannah, Prop	Seaforth.
Tuckersmith	Brucefield	Hugh McCartney	Brucefield.
BRUCE :			
Brant	*Elmwood	John Dirstine, Sec	Elmwood.
	Walkerton (Brills)	George Balkwill, Mgr	Walkerton.
Carrick	Mildmay	John Henderson	Mildmay.
Culross	Formosa	Sebastian Gfroerer, Sec	Formosa.
	Teeswater	S. R. Brill, Sec	Teeswater.
Elderslie	Chesley	Isaac Wenger, Prop	Ayton.
	Dobbinton	Wm. Harris	Dobbinton.
Kinloss	Whitechurch	John J. W. Simpson	Whitechurch.
GREY :			
Derby	Rock Spring	Wm. Gladstone	Owen Sound.
Egremont	Dromore	John Philp, Sec	Dromore.
	Holstein	David Allan, Sec	Holstein.
Glenelg	Durham	A. Davidson, Sec	Durham.
Normanby	Ayton	Isaac Wenger, Prop	Ayton.
	Saugeen Valley	John B. Ashley, Sec	Neustadt.
Sydenham	Pleasant Vallley	James Struthers, Prop	Owen Sound.
MIDDLESEX :			
London	†Medway	Jas. Carmichael	Arva.
PERTH :			
Blanshard	Kirkton	John Hannah, Prop	Seaforth.
WELLINGTON :			
Guelph	Agricultural College	President of College	Guelph.
WATERLOO :			
Waterloo	*Breslau	M. Brubacher	Breslau.
Wellesley	Cross Hill	John T. Wilford, Sec	Cross Hill.
Wilmot	†Nith Valley	Henry D. Tye, Sec	Haysville.
Woolwich	St. Jacobs	Isaac Hilborn, Sec	Elmira.
DURHAM :			
Cartwright	Cedar Grove	Robert Philp, Prop	Cadmus.
PRINCE EDWARD :			
Ameliasburg	†Sprague	John Sprague, Salesman	Ameliasburg.
	*Willow Glen	McAuley & Miller	Picton.
LEEDS AND GRENVILLE :			
Edwardsburg	Ventnor	Millar & Ferguson, Props	Spencerville.
Yonge	Twin Elms	C. Johnson & Son, Props	Athens.
DUNDAS :			
Matilda	*Banford & Johnston	A. Steinbury	Hainsville.
	Rutherford	Richard Gibbons, Sec	Irena.
STORMONT :			
Osnabruck	†Stormont	John H. Croil	Aultsville.
GLENGARRY :			
Charlottenburg	Gore	Abrams & McLennan, Props	Camerontown.
RUSSELL :			
Russell	*St. Onge	Mr. Dupuis	St. Onge.

† Makes both butter and cheese.

STATISTICS OF

LIVE STOCK AND DAIRY PRODUCTS.

HORSES AND HOGS.

TABLE I. Showing by County Municipalities and groups of Counties the numbers of Horses and of Hogs in Ontario in the years 1889 and 1890.

Counties.	Horses.					Hogs.			
	Working horses.	Breeding mares.	Unbroken horses.	Totals.		Over 1 year.	Under 1 year.	Totals.	
				1890.	1889.			1890.	1889.
Essex	8,079	4,405	6,570	19,054	15,744	15,283	44,298	59,581	55,724
Kent	9,784	5,214	8,062	23,060	20,033	11,597	58,908	70,505	59,422
Elgin	7,381	3,355	5,691	16,427	15,121	7,511	38,964	46,475	34,660
Norfolk	6,261	2,661	4,659	13,581	12,896	6,275	27,821	34 096	26,643
Haldimand	5,468	2,453	4,262	12,183	11,230	3,518	15,785	19,303	13,264
Welland	5,421	1,410	3,099	9,930	9,951	2,548	10,127	12,675	7,302
Totals	42,394	19,498	32,343	94,235	84,975	46,732	195,903	242,635	197,015
Lambton	8,213	3,416	6,608	18,237	15,638	5,547	23,503	29,050	17,972
Huron	12,786	7,311	11,255	31,352	29,439	7,860	35,829	43,689	30,679
Bruce	10,239	4,888	7,502	22,629	21,673	7,630	27,137	34,767	24,445
Totals	31,238	15,615	25,365	72,218	66,750	21,037	86,469	107,506	73,096
Grey	13,143	5,892	8,461	27,496	26,993	9,664	36,858	46,522	33,495
Simcoe	13,186	5,275	7,740	26,201	25,862	9,228	39,878	49,106	40,609
Totals	26,329	11,167	16,201	53.697	52,855	18,892	76,736	95,628	74,104
Middlesex	14,653	6,818	10,940	32,411	29,399	8,883	45,514	54,397	39,863
Oxford	9,839	3,583	5,696	19,118	19,480	5,764	35,049	40,813	31,021
Brant	5,331	1,668	3,155	10,154	10,438	2,619	16,005	18,624	14,108
Perth	8,947	4,745	7,044	20,736	20,410	5,496	29,740	35,236	25,364
Wellington	11,527	5,187	7,434	24,148	23,024	7,559	39,688	47,247	32,556
Waterloo	7,093	2,482	3,796	13,371	12,916	3,350	20,373	23,723	15,041
Dufferin	4,961	1,996	2,746	9,703	8,658	3,376	15,894	19,270	13,491
Totals	62,351	26.479	40,811	129,641	124,325	37,047	202,263	239,310	171,444
Lincoln	5,138	1,535	2,987	9,660	9,232	2,116	11,748	13,864	9,659
Wentworth	7,500	2,245	4,293	14,038	13,224	3,388	17,662	21,050	13,671
Halton	5,188	1,578	2,834	9,600	8,582	2,293	13,964	16,257	8,342
Peel	6,742	2,638	4,388	13,768	12,924	3,732	19,859	23,591	18,240
York	13,220	5,885	8,227	27,332	25,390	7,354	41,611	48,965	37.913
Ontario	8,891	5,140	7,602	21,633	19,089	6,274	27,096	33,370	24,756
Durham	7,722	2,855	4,705	15,282	14,802	4,479	16,582	21,061	14,035
Northumberland	9,139	2,783	5,250	17,172	17,114	4,763	17,338	22,101	16,712
Prince Edward	5,691	2,336	4,059	12,086	11,194	1,931	8,795	10,726	4,905
Totals	69,231	26,995	44,345	140,571	131,551	36,330	174,655	210,985	148,233
Lennox & Addington	5,072	2,090	3,908	11,070	9,649	2,626	8,783	11,409	7,733
Frontenac	5,660	1,599	2,824	10,083	9,065	3,178	9,284	12.462	7,732
Leeds and Grenville	11,662	2,995	5,336	19,993	19,418	8,605	21,382	29,987	18,995
Dundas	4,368	1,426	2,553	8,347	8,066	4,162	6,774	10,936	9,154
Stormont	3,511	1,555	2,661	7,727	7,473	2,928	5,131	8,059	6,765
Glengarry	4,742	2,192	3,130	10,064	9,195	3,842	6,826	10,668	7,355
Prescott	3,551	1,544	2,730	7,825	7,648	4,188	5,509	9,697	8,863
Russell	2,603	1,082	1,573	5,258	4,816	2,892	4,535	7,427	4,669
Carleton	7.475	3,166	4,202	14,843	14,257	5,455	16,025	21,480	15,791
Renfrew	6,556	2,649	4,031	13,236	11,663	8,223	11,181	19,404	15,364
Lanark	6,105	1,740	2,668	10,513	10,000	3,810	11,284	15,094	13,224
Totals	61,305	22.038	35,616	118,959	111,250	49,909	106,714	156,623	115,645
Victoria	6,165	2,936	4,557	13,658	12,565	4,444	17,659	22,103	14,352
Peterborough	5,880	1,800	2,994	10,674	10,277	6,197	14,674	20,871	13,971
Haliburton	668	294	296	1,258	1,055	792	1,713	2,505	1,434
Hastings	9,478	2,833	5,900	18,211	18,238	7,719	22,001	29,720	18,654
Totals	22,191	7,863	13,747	43,801	42,135	19,152	56,047	75,199	48,411
Muskoka	1,264	563	599	2,426	2,452	1,042	3,030	4,072	2,824
Parry Sound	841	378	396	1,615	995	750	2,201	2,951	1,686
Nipissing	316	78	66	460	....	283	576	859	....
Algoma	1,000	479	534	2,013	1,507	1,020	3,771	4,791	3,011
Totals	3,421	1,498	1,595	6,514	4,954	3,095	9,578	12,673	7,521
The Province	318,460	131,153	210,023	659,636	618,795	232,194	908,365	1,140,559	835,469

CATTLE.

TABLE II. Showing by County Municipalities and groups of Counties the number of Cattle in Ontario in the years 1889 and 1890.

Counties.	Working oxen.	Milch cows.		Store cattle over 2 years.	Young and other cattle.	Totals.	
		1890.	1889.			1890.	1889.
Essex	247	14,600	13,760	9,030	16,343	40,220	37,382
Kent	84	18,311	18,699	13,494	24,487	56,376	57,647
Elgin	264	18,608	18,166	9,239	20,034	48,145	47,417
Norfolk	472	14,031	15,969	3,481	11,749	29,733	33,079
Haldimand	118	12,231	12,110	4,077	11,521	27,947	28,807
Welland	312	8,739	8,890	2,804	8,350	20,205	20,069
Totals	1,497	86,520	87,594	42,125	92,484	222,626	224,401
Lambton	63	18,693	17,573	17,532	27,327	63,615	59,935
Huron	167	29,431	30,256	31,619	43,503	104,720	107,534
Bruce	681	26,566	27,748	19,897	36,257	88,401	83,467
Totals	911	74,690	75,577	69,048	107,087	251,736	250,936
Grey	996	32,465	34,308	22,367	47,510	103,338	102,179
Simcoe	563	23,816	24,811	14,075	28,983	67,437	70,348
Totals	1,559	56,281	59,119	36,442	76,493	170,775	172,527
Middlesex	98	35,864	36,396	28,292	44,310	108,564	105,039
Oxford	151	35,194	34,775	12,007	23,519	70,871	67,602
Brant	67	10,584	10,415	3,197	9,846	23.694	23,799
Perth	110	26,137	26,178	15,380	31,381	73,008	76,243
Wellington	161	24,635	26,107	16,365	33,265	74,426	79,000
Waterloo	116	13,728	14,755	4,819	14,927	33,590	36,172
Dufferin	107	9,501	9,629	7,360	13,138	30,106	30,052
Totals	810	155,643	158,255	87,420	170,386	414,259	417,907
Lincoln	135	7,506	8.620	2,738	6,588	16,967	18,913
Wentworth	78	13,679	13,534	3,138	10,556	27,451	29,532
Halton	44	10,162	9,599	4,956	9,470	24,632	25,580
Peel	69	11,558	12,538	4,900	10,000	26.527	29,172
York	78	21,971	20,973	6,988	14,120	43,157	46,765
Ontario	95	15,832	16,320	8,506	22,436	46,869	48,932
Durham	96	10,912	12,326	5,358	13,174	29,540	34,525
Northumberland	146	19,959	21,191	4,588	13,928	38,621	42,917
Prince Edward	40	10,064	8,901	1,323	6,800	18,227	16,878
Totals	781	121,643	124,002	42,495	107,072	271,991	293,214
Lennox and Addington	152	14,671	12,680	3,584	10,407	28,814	25,889
Frontenac	442	16,675	15,505	4,689	13,998	35,804	29,875
Leeds and Grenville	68	45,597	45,401	5,817	22,803	74,285	71,840
Dundas		16,756	17,841	2,252	7,196	26,204	28,482
Stormont		15,824	15,471	2,539	7,653	26,016	24,086
Glengarry		19,319	18,375	1,710	10,023	31,052	30,101
Prescott		11,999	13,027	2,404	7,357	21,760	21,889
Russell		7,053	5,925	2,550	6,300	15,903	12,964
Carleton	16	24,123	23,587	7,251	16,166	47,556	46,849
Renfrew	101	17,886	16,823	7,770	21,842	47,599	40,530
Lanark	19	19,587	18,553	7,071	17,808	44,485	41,533
Totals	798	209,490	203,188	47,637	141,553	399,478	374,038
Victoria	133	11,935	12,297	6.337	14,999	33,404	36,138
Peterborough	340	14,527	14,728	4,377	12,002	31,246	33,820
Haliburton	355	2,622	2,405	1,083	3,484	7,544	6,158
Hastings	1,093	33,296	33,379	6,309	19,013	59,711	56,812
Totals	1,921	62,380	62,809	18,106	49,498	131,905	132,928
Muskoka	676	4,471	4,511	1,559	5,178	11,884	12,784
Parry Sound	488	2,785	1,918	1,166	3,941	8,380	5,715
Nipissing	112	738		359	811	2,020	
Algoma	614	3,197	2,198	1,283	4,564	9,658	7,449
Totals	1,890	11,191	8,627	4,367	14,494	31,942	25,948
The Province	10,167	777,838	779,171	347,640	759,067	1,894,712	1,891,899

SHEEP AND POULTRY.

TABLE III. Showing by County Municipalities and groups of Counties the numbers of Sheep and of Poultry in Ontario in the years 1889 and 1890.

Counties.	Sheep.				Poultry.				
	Over 1 year.	Under 1 year.	Totals.		Turkeys	Geese.	Other fowls.	Totals.	
			1890.	1889.				1890.	1889.
Essex	16,394	11,517	27,911	22,082	9,276	15.128	134,291	158,695	179,019
Kent..........	20,711	15,517	36,228	27,711	11,287	11,296	171,651	194,234	191,205
Elgin..........	22,437	17,868	40,305	32,025	13,365	6,543	156,936	176,844	169,473
Norfolk	13,325	9,820	23,145	22,182	7,717	5,013	124,009	136,739	134,151
Haldimand ...	15,085	10,317	25,402	22,137	8,458	5,955	109,395	123,808	112,801
Welland	11,642	8,326	19,968	19,901	6,846	6,006	90,035	102,887	92,903
Totals....	99,594	73,365	172,959	146,038	56,949	49,941	786,317	893,207	879,552
Lambton......	24,863	19,549	44,412	34,042	12,728	10,391	171,801	194,920	162,255
Huron.........	39,052	32,377	71,429	65,570	15,855	24,088	313,165	353,108	334,126
Bruce	43,832	28,188	72,020	73,044	8,797	16,347	205,466	230,610	230,888
Totals....	107,747	80,114	187,861	172,656	37,380	50,826	690,432	778,638	727,269
Grey..........	61,196	41,541	102,737	104,116	14,814	24,037	266.122	304,973	293,582
Simcoe.........	37,355	23,046	60,401	63,831	19,184	21,551	238,732	279,467	263,704
Totals....	98,551	64,587	163,138	167,947	33,998	45,588	504,854	584,440	557,286
Middlesex	32,812	23,623	56,435	48,151	32,493	19,838	307,360	359,691	355,736
Oxford........	11,303	8,295	19,598	24,717	8,012	5,470	188,874	202,356	198,031
Brant	9,856	7,925	17,781	16,710	7,187	3,660	82,923	93,770	89,124
Perth	25,817	18,290	44,107	45,630	9,574	16,588	221,007	247,169	228,859
Wellington ...	37,626	25,594	63,220	67,516	15,347	21,847	224,230	261,424	244,306
Waterloo	18,214	11,949	30,163	29,041	3,622	4,548	130,791	138,961	127,087
Dufferin......	14,450	9,649	24,099	26,075	10,345	11,263	99,409	121,017	98,928
Totals....	150,078	105,325	255,403	257,840	86,580	83,214	1,254,594	1,424,388	1,342,071
Lincoln	7,172	6,003	13,175	15,080	5,800	4,940	77,172	87,912	73,167
Wentworth...	12,044	8,472	20,516	20,261	7,799	6,224	111,895	125,918	101,967
Halton	8,556	6,475	15,031	16,495	6,444	6,680	81,071	94,195	78,216
Peel	9,011	6,053	15,064	20,697	18,459	16,101	121,830	156,390	118,213
York..........	19,933	11,736	31,669	34,225	19,263	16,777	204,649	240,689	218,829
Ontario	20,342	14,467	34,809	39,320	13,619	11,316	176,554	201,489	177,111
Durham	14,571	9,691	24,262	28,419	13,408	12,679	139,872	165,959	138,657
Northumberl'd	14,304	9,902	24,206	28,163	10,901	10,498	152,977	174,376	145,435
Prince Edw'd.	6,037	4,311	10,348	11,815	2,084	3,007	98,112	103,203	79,135
Totals....	111,970	77,110	189,080	214,475	97,777	88,222	1,164,132	1,350,131	1,130,730
Lennox & Ad.	9,396	7,146	16,542	14,360	5,488	5,801	92,646	103,935	81,882
Frontenac	13,892	9,236	23,128	19,880	8,290	5,750	80,939	94,979	74,069
Leeds & Gren.	24,201	18,370	42,571	42,701	31,249	15,419	190,046	236,714	213,159
Dundas	5.893	4,719	10,612	11,799	6,286	5,196	94,851	106,333	111,628
Stormont.....	6,771	2,975	9,746	12,203	4,118	5,121	77,225	86,464	88,469
Glengarry	10,000	5,745	15,745	17,254	2,172	5,252	92,556	99,980	103,222
Prescott	8,537	5,241	13,778	17,052	7,604	2,986	64,206	74,796	63,063
Russell.......	6,023	3,986	10,009	7,761	4,609	3,744	39,224	47,577	41,661
Carleton......	19,668	11,375	31,043	37,632	28,233	15,862	143,486	187,581	163,239
Renfrew	33,184	18,364	51,548	55,036	12,730	8,651	95,951	117,332	114,794
Lanark.......	27,635	14,854	42,489	40,227	14,427	14,132	110,513	139,072	115,275
Totals....	165,200	102,011	267,211	275,905	125,206	87,914	1,081,643	1,294,763	1,170,461
Victoria	16,558	11,173	27,731	27,947	9,773	9,286	113,081	132,140	131,009
Peterborough .	12,083	8,185	20.268	22,360	8,263	8,996	110,592	127,851	133,204
Haliburton ...	2,993	1,984	4,977	4,579	830	982	14,071	15,883	11,973
Hastings	14,440	9,312	23,752	34,198	4,760	8,236	148,767	161,763	154,238
Totals....	46,074	30,654	76,728	89,084	23,626	27,500	386,511	437,637	430,424
Muskoka	5,438	4,213	9,651	9,724	1,757	2,048	28,341	32,146	30,208
Parry Sound .	3,894	2,556	6,450	3,436	938	1,023	21,004	22,965	13,845
Nipissing.....	449	246	695	....	497	495	6,179	7,171	....
Algoma	6,268	4,251	10,519	7,075	2,034	1,951	25,393	29,378	22,452
Totals....	16,049	11,266	27,315	20,235	5,226	5,517	80,917	91,660	66,505
The Province.	795,263	544,432	1,339,695	1,344,180	466,742	438,722	5,949,400	6,854.864	6,304,298

WOOL.

Table IV. Showing by County Municipalities and groups of Counties the clip of Wool in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90; also the average number of pounds per fleece.

Counties.	1890.			1889.			Yearly average for the nine years 1882-90.		
	No. of fleeces.	Pounds.	lb. per fleece	No. of fleeces.	Pounds.	lb. per fleece	No. of fleeces.	Pounds.	lb. per fleece
Essex	15,401	83,898	5.45	12,874	76,729	5.96	14,486	81,111	5.60
Kent	20,447	113,515	5.55	16,682	99,091	5.94	20,631	117,099	5.68
Elgin	23,021	133,457	5.80	18,062	108,733	6.02	22,691	129,371	5.70
Norfolk	13,245	72,753	5.49	12,511	66,684	5.33	16,677	87,983	5.28
Haldimand	15,282	89,246	5.84	12,507	74,792	5.98	17,987	106,044	5.90
Welland	11,845	60,503	5.11	11,881	59,167	4.98	14,212	71,882	5.06
Totals	99,241	553,372	5.58	84,517	485,196	5.74	106,684	593,490	5.56
Lambton	24,733	145,390	5.88	19,676	118,056	6.00	25.283	147,050	5.82
Huron	39,384	233,098	5.92	39,342	226,217	5.75	48,191	273,590	5.68
Bruce	44,831	271,869	6.06	45.799	271,130	5.92	47,977	273,763	5.71
Totals	108,948	650,357	5.97	104,817	615,403	5.87	121,451	694,403	5.72
Grey	62,692	357,379	5.70	63,407	360,152	5.68	69,333	382,305	5.51
Simcoe	37,126	209,817	5.65	40,852	227,954	5.58	45,029	247,709	5.50
Totals	99,818	567,196	5.68	104,259	588,106	5.64	114,362	630,014	5.51
Middlesex	33,017	200,235	6.06	28,361	171,868	6.06	37,637	223,180	5.93
Oxford	11,435	64,603	5.65	14,212	81,577	5.74	19.761	112,608	5.70
Brant	10,074	58,103	5.77	9,592	56,593	5.90	14,083	80,453	5.71
Perth	26,128	157,185	6.02	26,420	149,273	5.65	32,295	182,147	5.64
Wellington	38,235	225,946	5.91	41,725	235,746	5.65	47,605	269,883	5.67
Waterloo	18,380	102,289	5.57	18,122	96,047	5.30	22,372	120,552	5.39
Dufferin	14,646	84,971	5.80	16,505	91,438	5.54	18,016	100,740	5.59
Totals	151,915	893,332	5.89	154,937	882,542	5.70	191,769	1,089,563	5.68
Lincoln	7,703	40,151	5.21	8,626	42,095	4.88	10,352	52,937	5.11
Wentworth	12,094	69,195	5.72	11,468	66,400	5.79	15,026	84,859	5.65
Halton	8,705	55,811	6.41	9,716	57,033	5.87	11,762	72,542	6.17
Peel	8,850	59,383	6.71	13,287	84,505	6.36	15,352	99,929	6.51
York	20,366	119,912	5.89	20,638	122,590	5.94	27,578	164,290	5.96
Ontario	20,942	126,623	6.05	23,867	144,395	6.05	27,075	165,122	6.10
Durham	15,518	91,072	5.87	17,705	102,689	5.80	20,957	121,116	5.78
Northumberland	14,371	86,203	6.00	16,785	98,696	5.88	20,603	117,810	5.72
Prince Edward	6,101	33,194	5.44	7,325	37,431	5.11	9,521	50.036	5.26
Totals	114,650	681,544	5.94	129,417	755,834	5.84	158,226	928,641	5.87
Lennox and Addington	9,594	55,228	5.76	9,277	51,395	5.54	14,925	78,522	5.26
Frontenac	14,377	78,717	5.48	12,067	65,524	5.43	18,593	93,464	5.03
Leeds and Grenville	24.596	127,943	5.20	27,030	129,744	4.80	37,063	179,936	4.85
Dundas	5,936	32,027	5.40	7,752	39,303	5.07	10,920	54,418	4 98
Stormont	6,703	36,347	5.42	8,176	44,232	5.41	9,908	51,077	5.16
Glengarry	10,100	52,089	5.16	11,974	56.517	4.72	15,499	72,428	4.67
Prescott	8,622	45,055	5.23	10,231	52,792	5.16	10,979	53,542	4.88
Russell	6,343	35,297	5.56	5,697	27,004	4.74	7,898	37,997	4.81
Carleton	19,930	104,743	5.26	24,611	129,208	5.25	28,849	145,604	5.05
Renfrew	33,748	165,218	4.90	36,214	172,741	4.77	37,081	168,063	4.53
Lanark	28,505	141,909	4.98	25,745	125,893	4.89	33,280	159,575	4.79
Totals	168,454	874,573	5.19	178,774	894,353	5.00	224,995	1,094,626	4.87
Victoria	17,378	100,247	5.77	17,942	97,784	5.45	21,677	120,171	5.54
Peterborough	12,377	64,990	5.25	13,930	73,968	5.31	16,877	88,710	5.26
Haliburton	3,065	15,239	4.97	3,118	15 871	5.09	3,368	16,036	4.76
Hastings	15,068	81,450	5.41	21,271	103,802	4.88	25,626	125,376	4.89
Totals	47,888	261,926	5.47	56,261	291,425	5.18	67,548	350,293	5.19
Muskoka	5,549	29,076	5.24	6,184	34,198	5.53	5,829	31,252	5.36
Parry Sound	4,082	22,498	5.51	2,519	15,265	6.06	2,273	13,030	5.73
Nipissing	466	2,177	4.67	....	....	......	52	242	4.67
Algoma	6,475	38,649	5.97	4,245	26,574	6.26	3,446	20,460	5 94
Totals	16,572	92,400	5.58	12,948	76,037	5.87	11,600	64,984	5.60
The Province	807,486	4,574,700	5.67	825,930	4,588,896	5.56	996.635	5,446,014	5.46

FACTORY CHEESE.

TABLE V. Showing by County Municipalities and groups of Counties the quantity and value of cheese made at 664 factories in Ontario in 1890, the average dates of opening and closing, and the total number of factories reported in operation.

Counties.	Factories in operation.	Factories making returns.	Quantity of—		Gross value of cheese.	Average No. of patrons.	Milk required to make 1 lb. cheese.	Value of cheese per 100 lb.	Average date of opening.	Average date of closing.
			Milk used.	Cheese made.						
	No.	No.	lb.	lb.	$		lb.	$ c.		
Essex	1	1	549,271	50,025	4,518	90	10.98	9 03	May 12	Sep. 6
Kent	11	6	4,096,295	381,992	34,304	363	10.72	8 98	〃 16	Oct. 24
Elgin	27	24	30,343,020	2,844,387	258,704	1,738	10.67	9 10	Apr. 29	Nov. 10
Norfolk	22	19	18,494,943	1,724,875	154,736	1,402	10.72	8 97	May 2	〃 7
Haldimand	11	9	8,018,550	762,883	67,624	646	10.51	8 86	〃 12	Oct. 30
Welland	3	1	1,425,157	132,774	11,884	92	10.73	8 95	〃 12	Nov. 24
Total	75	60	62,927,236	5,896,936	531,770	4,331	10.67	9 02	〃 4	〃 6
Lambton	16	10	8,118,187	755,276	68,182	741	10.75	9 03	〃 13	〃 1
Huron	16	15	17,851,470	1,654,675	151,686	1,308	10.79	9 17	〃 14	Oct. 31
Bruce	22	18	21,599,392	2,013,883	182,297	1,572	10.73	9 05	〃 17	〃 25
Total	54	43	47,569,049	4,423,834	402,165	3,621	10.75	9 09	〃 15	〃 29
Grey	11	10	8,830,548	842,803	75,002	698	10.48	8 90	〃 20	〃 18
Simcoe	6	5	2,237,516	212,965	19,135	206	10.51	8 99	〃 23	〃 13
Total	17	15	11,068,064	1,055,768	94,137	904	10.48	8 91	〃 21	〃 16
Middlesex	40	36	50,825,388	4,717,755	433,118	2,642	10.77	9 18	〃 2	Nov. 6
Oxford	43	39	84,297,098	7,914,767	724,297	2,874	10.65	9 15	Apr. 19	〃 18
Brant	8	6	6,330,352	599,022	53,145	376	10.57	8 87	〃 28	〃 5
Perth	26	22	34,105,543	3,162,573	294,621	1,673	10.78	9 32	May 6	〃 6
Wellington	11	10	13,382,441	1,267,946	115,802	879	10.55	9 13	〃 19	Oct. 30
Waterloo	5	4	4,276,516	395,201	36,765	296	10.82	9 30	〃 13	Nov. 1
Dufferin	3	3	1,329,135	126,424	11,344	134	10.51	8 97	〃 20	Oct. 15
Total	136	120	194,546,473	18,183,688	1,669,092	8,874	10.70	9 18	〃 1	Nov. 8
Lincoln	4	3	2,108,187	195,640	17,271	225	10.78	8 83	May 14	Oct. 25
Wentworth	3	2	1,663,959	161,541	14,800	82	10.30	9 16	〃 8	Nov. 3
Peel	1	1	425,348	39,400	3,500	30	10.80	8 88	〃 15	Oct. 10
York	3	3	495,336	46,777	4,519	55	10.59	9 66	June 3	Sep. 21
Ontario	1	1	321,180	28,663	2,700	40	11.21	9 42	May 26	Oct. 13
Durham	6	6	3,443,940	321,896	28,761	277	10.70	8 93	〃 9	〃 31
Northumberland	36	32	30,181,191	2,870,487	259,142	1,505	10.51	9 03	Apr. 29	Nov. 3
Prince Edward	17	13	11,346,069	1,080,091	94,934	922	10.50	8 79	May 3	Oct. 24
Total	71	61	49,985,210	4,744,495	425,627	3,136	10.54	8 97	〃 4	〃 28
Lennox & Addington.	21	19	26,129,718	2,531,724	232,057	1,646	10.32	9 17	〃 1	Nov. 2
Frontenac	39	26	17,057,760	1,647,701	146,304	763	10.35	8 88	〃 5	Oct. 27
Leeds and Grenville.	107	87	86,933,075	8,269,785	741,683	3,599	10.51	8 97	Apr. 26	Nov. 2
Dundas	36	26	19,636,805	1,879,508	168,590	928	10.45	8 97	May 1	Oct. 29
Stormont	28	23	17,397,482	1,683,586	147,308	983	10.33	8 75	〃 2	〃 26
Glengarry	38	24	11,216,784	1,078,297	96,753	650	10.40	8 97	〃 7	〃 26
Prescott	32	21	10,471,157	1,025,904	90,580	646	10.21	8 83	〃 6	〃 25
Russell	9	7	3,150,638	306,735	27,011	204	10.27	8 81	〃 16	〃 15
Carleton	20	12	6,903,035	653,877	59,337	414	10.56	9 07	〃 16	〃 18
Renfrew	4	4	1,589,111	156,178	13,476	142	10.17	8 63	〃 23	〃 12
Lanark	25	23	22,168,166	2,131,628	190,137	1,299	10.40	8 92	〃 7	〃 23
Total	359	272	222,653,731	21,364,923	1,913,236	11,274	10.42	8 96	〃 3	〃 28
Victoria	10	10	6,027,252	572,093	51,663	470	10.54	9 03	〃 16	〃 31
Peterborough	22	19	21,692,524	2,032,660	185,869	1,062	10.67	9 14	〃 3	〃 30
Haliburton	6	4	909,261	89,784	7,948	78	10.13	8 85	〃 15	〃 31
Hastings	67	60	62,378,006	6,137,862	561,983	2,691	10.16	9 16	Apr. 28	Nov. 2
Total	105	93	91,007,043	8,832,399	807,463	4,301	10.30	9 14	May 1	〃 1
The Province	817	664	679,756,806	64,502,043	5,843,490	36,441	10.54	9 06	〃 4	Oct. 31
Estimated at 153 factories not reported.	....	.....	156,630,710	14,862,670	1,346,467	8,397	.....	.....	....	....
Total for 817 factories.	....	.....	836,387,516	79,364,713	7,189,957	44,838	.....	......	......	....

PART III.

VALUES, RENTS AND FARM WAGES.

VALUES OF FARM PROPERTY.

The table below gives the value of farm property by county groups for the years 1889 and 1890, under the heads of land, buildings, implements and live stock, the totals for the province in each of these years, and the average for the nine years 1882–90 :

Districts.		Farm land.	Buildings.	Implements.	Live stock.	Total farm property.
		$	$	$	$	$
Lake Erie	1890	87,352,875	25,399,366	6,784,793	13,822,445	133,359,479
	1889	87,865,147	25,039,332	6,876,644	13,457,339	133,238,462
Lake Huron	1890	69,912,071	19,495,144	5,407,097	12,611,995	107,426,307
	1889	70,696,974	18,991,619	5,503,309	12,638,402	107,830,304
Georgian Bay	1890	48,931,045	14,392,172	4,285,087	8,784,252	76,392,556
	1889	48,930,443	14,759,680	4.529,700	9,221,997	77,441,820
West Midland	1890	131,682,712	42,095,403	10,164,923	22,666,507	206,609,545
	1889	136,387,257	42,161,762	10,478,851	22,208,386	211,236,256
Lake Ontario	1890	135,869,460	44,454,383	10,508,724	20,474,216	211,306,783
	1889	138,904,264	43,340,883	10,864,907	20,798,891	213,908,945
St. Lawrence and Ottawa	1890	103,794,410	34,491,377	9,418,689	18,029,706	165,734,182
	1889	104,077,562	34,727,499	9,496,358	19,099,339	167,400,758
East Midland	1890	39,462,646	11,493,877	3,384,004	6,432,464	60,772,991
	1889	40,728,431	12,237,461	3,494,646	7,309,068	63,769,606
Northern Districts	1890	5.880,781	1,617,104	562,266	1,265,041	9,325,192
	1889	4,739,355	1,206,001	441,291	997,866	7,384,513
The Province :						
1890		622,886,000	193,438,826	50,515,583	104,086,626	970,927,035
1889		632,329,433	192,464,237	51,685,706	105,731,288	982,210,664
1882-90		635,514,008	177,145,010	47,632,015	100,965,860	961,256,893

The total value of farm property in Ontario is $970,927,035, which is less by $11,283.629 than in 1889. This loss in value is divided between three of the four items of the table as follows : Farm land, $9,443,433 ; implements, $1,170,123, and live stock, $1,644,662. A net increase of $974,589 is observed in the total value of buildings, although four of the groups fail to show an improvement. Outside of the newly settled Northern Districts, the Georgian Bay is the only group that does not show an increase in the value of farm land over last year's figures, while in the matter of implements the Northern Districts alone report an advanced value. Live stock have declined in value in every group excepting the Lake Erie and West Midland and the Northern Districts. The Lake Erie group is the only one of the older districts which has an increase in the total value of farm property ; but of course the Northern Districts show a great gain. The value of the farm land of the province is about two per cent. below the average derived for the nine years, but owing to additions in the values of buildings, implements and live stock, the total farm property is about one per cent. higher than the average annual value.

VALUE PER ACRE OCCUPIED. The value per acre occupied, by classes of farm property, is shown in the following table by county groups and for the province for 1889 and 1890:

Districts.	Farm land.		Buildings.		Implements.		Live stock.		Total farm property.	
	1890.	1889.	1890.	1889.	1890.	1889.	1890.	1889.	1890.	1889.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Lake Erie	37 40	37 50	10 87	10 69	2 90	2 93	5 92	5 74	57 09	56 86
Lake Huron	30 73	31 14	8 57	8 37	2 38	2 42	5 54	5 57	47 22	47 50
Georgian Bay	24 31	24 17	7 15	7 29	2 13	2 24	4 37	4 56	37 96	38 26
West Midland	40 52	41 96	12 95	12 97	3 13	3 22	6 97	6 83	63 57	64 98
Lake Ontario	44 63	45 55	14 60	14 21	3 45	3 56	6 72	6 82	69 40	70 14
St. Lawrence and Ottawa	19 68	19 72	6 54	6 58	1 79	1 80	3 42	3 62	31 43	31 72
East Midland	14 89	15 33	4 34	4 61	1 28	1 31	2 43	2 75	22 94	24 00
Northern Districts	3 73	3 99	1 02	1 01	0 36	0 37	0 80	0 84	5 91	6 21
The Province	27 79	28 66	8 63	8 73	2 25	2 34	4 64	4 79	43 31	44 52

The statement for the province is very discouraging. Land has decreased in value 87 cents per acre in the year, buildings 10 cents, implements 9 cents and live stock 15, making a decline of $1.21 per acre in the total value of farm property. The greatest relative decline in the value of all farm property occurs in the East Midland group, while an increase upon their figures of 1889 is observed in the Lake Erie counties. The Lake Ontario group shows the highest figures in the value per acre occupied of farm land, buildings and implements, but in the item of live stock it is surpassed by the West Midland district, which has made a considerable increase in the value of this class of farm property.

Calculated upon the total area occupied the values per acre of buildings, implements and live stock show a very wide range in the various groups into which the province has been divided. Their distribution is thus indicated, but if we base our averages upon the area cleared, as is done in the following table, we will find no such marked divergence, but that these improvements follow closely the advance in settlement or territory cleared:

Farm property.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern Districts.	The Province.		
									1890.	1889.	1882-90.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Buildings	18 17	14 67	13 81	18 34	19 32	14 99	13 69	10 38	16 59	16 76	16 13
Implements	4 85	4 12	4 11	4 43	4 13	4 09	4 03	3 61	4 33	4 50	4 34
Live stock	9 89	9 49	8 43	9 89	8 90	7 83	7 66	8 12	8 93	9 21	9 19
Total	32 91	28 28	26 35	32 66	32 35	26 91	25 38	22 11	29 85	30 47	29 66

It will be seen that with the exception of farm buildings the newest portion of the province, the Northern Districts, is well equipped as compared with the older counties. In the aggregate the Lake Erie, West Midland and Lake Ontario groups are bunched as leaders.

MARKET PRICES. The following table is made up from market reports of newspapers published at fourteen market centres, the figures being taken during the period when each of the various articles of farm produce comprising the table are mainly marketed. The average price is also given for a series of years :

Markets.	Fall wheat, per bushel.	Spring wheat, per bushel.	Barley, per bushel.	Oats, per bushel.	Rye, per bushel.	Pease, per bushel.	Corn (in ear), per bushel.	Buckwheat, per bushel,	Beans, per bushel,	Potatoes, per bushel.	Carrots, per bushel.	Turnips, per bushel.	Hay, per ton.	Wool, per lb.
	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	$ c.	cts.
Belleville..........	84.8	94.3	51.0	37.7	52.4	57.3	34.0	....	......	44.7	....	....	6 38	23.0
Brantford	90.6	89.7	50.3	38.1	48.2	58.2	28.1	45.0	112.5	49.1	40.0	15.0	6 65	20.0
Brockville	97.7	97.7	49 2	42.3	51.1	65.3	....	42.5	183.7	41.5	45.0	29.8	7 40	19.0
Chatham	91.3	89.9	41.6	38.7	....	52.9	24.2	....	106.9	49.9	....	....	6 94	19.6
Cobourg	89.4	86.4	49.2	38.2	54.7	57.6	....	35.9	.....	32.9	36.0	19.0	.....	....
Guelph......	93.3	88.2	47.5	38.3	45.1	58.0	....	....	......	36.3	....	12.9	6 90	21.3
Kingston..........	95.2	93.7	53.5	38.2	53.7	61.2	34.9	34.3	......	47.8	33.3	33.3	6 61	18.7
Lindsay	94.7	87.3	44.9	36.7	45.8	60.6	....	32.5	.....	29.0	....	....	6 62	19.0
London	91.9	91.5	46.3	39.6	55.6	58.5	30.6	46.6	121.8	42.6	29.4	28.3	7 29	19.7
Ottawa	101.0	101.1	48.6	42.7	42.5	61.3	33.5	....	......	35.6	24.7	18.0	9 40	18.5
Peterborough......	94.5	91.7	46.0	39.1	46.4	60.2	....	....	......	40.5	....	....	7 33	19.1
St. Thomas	91.7	.....	47.9	41.0	....	57.1	31.7	....	.....	47.8	...	....	6 62	19.0
Stratford..........	92.7	92.7	43.0	37.7	....	59.8	....	....	......	35.4	....	....	5 49	....
Toronto	96.5	90.1	54.4	44.3	53.1	62.8	....	....	......	48.4	31.2	24.9	8 99	23.1
The Province :														
1890........	94.2	91.3	50.2	41.1	52.7	60.3	30.5	43.0	128.5	44.3	31.5	25.6	7 95	20.5
1889	88.4	88.1	44.0	30.5	50.9	55.7	25.9	39.5	126.7	45.5	27.3	22.8	9 98	20.7
1888........	102.4	99.3	60.1	40.5	60.2	65.4	29.3	49.3	113.7	31.7	26.8	20.8	16 71	20.4
1887........	78.4	78.0	56.7	34 6	49.5	55.9	28.7	45.0	97.9	62.8	28.0	29.5	11 62	22.1
1886........	73.6	72.5	51.3	32.0	52.2	52.6	27.6	33.7	83.7	44.9	29.5	24.6	9 69	19.1
1885........	81.5	80.6	55.2	31.5	55.2	58.0	27.9	39.2	80.0	41.1	32.5	23.6	9 85	17.4
1884........	80.5	81.4	53.6	33.1	59.7	64.4	....	....	......	....	....	....	.....	....
1883........	105.0	107.0	57.0	38.0	62.0	71.0	....	....	.....	....	....	....	.....	....
1882........	101.0	106.0	65.0	43.0	64.0	74.0	....	....	.....	...	....	....	......	....
1885-90.	85.4	84.1	52.8	35.0	53.6	58.0	28.5	41.2	107.0	43.1	29.4	24.3	10 42	19.9
1882-90.	90.7	89.1	55.0	35.9	59.1	61.3	....	....	......	....	....	....	......	....

Of the fourteen items comprising the table, potatoes, hay and wool are the only ones which fail to equal their respective averages for the preceding year. Fall and spring wheat exceed their averages for 1882-90, but barley is 4.8 cents below its figures for the nine years, although 6.2 cents higher than in 1889, when the crop was much injured for the market by discoloration. Oats are 5.2 cents above the average for the nine years, but rye has a drop of 6.4 cents compared with the same term. Pease are one cent lower than the average for 1882-90. Of the remaining crops hay is the only one which shows a decrease compared with the averages in the six years (1885-90) for which a record has been kept. This falling off in the price of hay, however, is a large one, amounting to $2.47 per ton. The increase in yield nearly offset this reduction per acre.

VALUE OF CROPS. The value of each crop is given in the following table, based upon market prices, for each of the five years 1886-90, together with the averages for the six years 1885-90 and the nine years 1882-90. For the bracketed items no record was kept prior to 1885, but their averages for the six years are added to those of the other items for 1882-90 so as to give the nearest approximate average for the long term :

Crops.	1890.	1889.	1888.	1887.	1886.	Average 1885-90.	Average 1882-90.
	$	$	$	$	$	$	$
Fall wheat	13,439,875	11,493,648	14,162,726	11,321,439	13,300,361	13,537,141	15,745,344
Spring wheat....	7,015,405	5,019,680	6,408,384	4,393,831	6,900,951	6,182,823	7,738,005
Barley	7,831,285	10,290,011	14,043,308	9,715,448	10,009,799	10,169,398	10,838,360
Oats	21,687,734	19,625,622	26,514,099	17,247,443	18,772,995	20,207,544	20,310,715
Rye.............	823,883	728,725	779,772	442,969	577,573	675,799	1,031,138
Pease	9,279,756	7,524,645	9,332,490	6,804,892	8,439,004	8,250,730	8,227,182
Corn	4,273,410	2,395,283	5,108,976	2,412,164	2,982,265	3,361,491	
Buckwheat	883,100	502,668	602,585	461,409	565,725	602,585	
Beans	978,323	471,188	607,756	270,180	403,494	521,365	
Hay.............	34,232,024	37,208,564	33,570,674	35,947,748	29,016,182	33,668,153	56,642,491
Potatoes	7,779,575	6,531,766	7,060,733	6,705,784	7,189,548	7,322,644	
Carrots	1,326,321	936,925	1,044,820	589,592	1,029,710	1,008,770	
Turnips	12,042,384	8,440,847	9,909,169	9,266,970	11,577,019	10,157,483	
Totals......	121,593,075	111,169,572	129,145,492	105,579,869	110,764,626	115,665,926	120,533,235

The total value of the thirteen crops comprising the table is $121,593,075, which is $10,423,503 more than in the previous year and $1,059,840 more than the average of the eight years 1882-90. A great falling off is observed in the values of barley and hay compared with the preceding year, that of the former being lower in 1890 than in any other year of the table. A substantial increase is observed in the value of the remainder of the grains compared with the figures of 1889, although fall and spring wheats, rye and corn do not equal their averages for the long term. The root crops each exceed their values in any of the previous years.

CROP VALUES BY COUNTY GROUPS. The aggregate value of field crops for each of the five years 1886-90, together with the averages for two series of years, is presented in the following table by county groups and for the province :

Districts.	1890.	1889.	1888.	1887.	1886.	Average 1885-90.	Average 1882-90.
	$	$	$	$	$	$	$
Lake Erie........	14,791,696	12,926,470	17,889,286	12,080,651	13,485,030	14,361,449	14,553,271
Lake Huron......	13,634,099	11,009,721	14,303,010	11,936,938	11,438,427	12,553,355	12,988,489
Georgian Bay	11,465,081	10,391,701	10,969,814	9,447,927	9,447,776	10,258,013	10,855,881
West Midland....	27,655,714	22,006,961	29,217,226	22,805,391	23,691,683	25,010,326	25,954,287
Lake Ontario.....	25,675,051	25,342,044	27,908,395	22,386,070	24,623,942	25,230,000	26,491,065
St. L. and Ottawa	18,660,552	19,928,380	20,171,732	18,975,474	19,046,820	19,389,577	20,291,539
East Midland.....	7,847,766	8,089,324	7,213,525	6,459,491	7,870,811	7,421,307	7,917,920
Northern Districts	1,863,113	1,474,971	1,472,504	1,487,927	1,160,137	1,411,899	1,480,783
The Province...	121,593,075	111,169,572	129,145,492	105,579,869	110,764,626	115,665,926	120,533,235

A decrease is noted in the St. Lawrence and Ottawa and East Midland counties compared with their respective values in 1889, but in every other group an increase is observed, running as high as $5,648,753 in the case of the West Midland District. Four of the groups, viz., the Lake Erie, Lake Ontario, St. Lawrence and Ottawa and East Midland, fall below their averages for the nine years. The West Midland group regains its position as leader in the value of all field crops, the Lake Ontario counties once more falling into second place, although they are first in the average for nine years.

VALUE OF PRODUCE PER ACRE UNDER CROP. The following table gives the value per acre grown by each of the principal field crops by county groups and for the province for 1889 and 1890, together with averages for a series of six and nine years. The average value per acre of all field crops is also shown for the same periods :

Crops.	Lake Erie.	Lake Huron.	Georgian Bay.	West Midland.	Lake Ontario.	St. Lawrence and Ottawa.	East Midland.	Northern District.	The Province.			
									1890	1889	1885-90	1882-90
	$ c.	$ c.	$ c.	$ c	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Fall wheat	17 68	19 64	17 04	20 75	17 66	15 14	16 37	16 88	18 66	13 98	16 15	17 33
Spring wheat.....	12 04	14 17	12 10	15 11	10 85	10 23	11 14	13 35	11 66	12 59	11 49	13 59
Barley	10 31	12 21	12 12	13 44	10 30	9 90	9 98	10 66	11 17	11 76	13 34	14 18
Oats	9 80	11 95	12 31	12 75	11 57	10 52	11 46	11 02	11 52	10 20	11 54	12 36
Rye	7 60	9 93	8 01	8 75	7 20	8 47	8 24	9 73	7 99	8 09	8 25	9 58
Pease	9 04	12 78	13 09	11 59	11 77	12 10	13 16	13 32	11 88	10 63	11 61	12 47
Corn	20 44	17 81	16 60	19 00	17 13	19 00	15 70	11 53	19 09	12 80	17 97	
Buckwheat	9 06	6 80	7 94	8 62	9 55	10 60	10 02	10 27	9 80	8 91	9 02	
Beans	24 83	19 88	25 23	23 87	22 72	26 41	27 99	26 86	24 80	21 58	20 86	
Hay	14 58	14 22	14 23	16 45	14 49	11 52	12 62	13 71	13 90	15 59	14 44	19 69
Potatoes	35 00	46 08	64 59	51 83	42 78	51 75	50 27	64 67	49 21	44 80	48 93	
Carrots	95 93	111 55	114 80	117 94	118 47	99 76	110 24	68 90	110 74	83 20	97 36	
Turnips	85 28	112 06	108 93	105 56	118 79	93 98	91 43	88 58	108 44	75 97	94 94	
All crops :												
1890........	14 86	16 07	16 49	18 07	15 44	12 68	13 84	16 21	15 42	......	....	......
1889.......	13 63	13 59	14 46	14 93	15 24	13 75	13 93	15 71	......	14 37	....	....
1885-90....	15 20	15 80	15 20	17 06	15 56	13 76	13 33	15 90	......	.....	15 30	....
1882-90....	15 62	16 47	16 13	17 82	16 40	14 35	14 11	16 53	.....	......	......	16 01

The average value of produce per acre under crop is $15.42, which is $1.05 more than in 1889, but 59 cents less than the average for the nine years 1882-90. The best return per acre for all crops is found in the West Midland group, being $18.07, while the average value falls to $13.84 in the East Midland District. The root crops, which are the most expensive to handle, of course show the highest value per acre, and beans come next. While the average value per acre of fall wheat is $18.66, spring wheat, barley, oats and pease bunch close together at a much lower figure, the highest being $11.88 and the lowest $11.17 per acre. All the grain crops except fall wheat drop below their respective averages for the long term, but of the crops bracketted for the six years hay is the only crop which does not equal its average value per acre. The best values for each of the various crops are observed in the following groups : Fall wheat $20.75, spring wheat $15.11, barley $13.44, oats $12.75, and hay $16.45, in the West Midland group ; rye $9.93 and turnips $112.06 in the Lake Huron group ; pease $13.32 and potatoes $64.67 in the Northern Districts ; corn $20.44 in the Lake Erie group ; buckwheat $10.60 in the St. Lawrence and Ottawa counties ; beans $27.99 in the East Midland group, and carrots $118.47 in the Lake Ontario District.

PER CENT. RATIOS OF VALUES PER ACRE. In the following table the values per acre for 1890 are compared with their respective averages for the nine years

1882-90 by means of per cent. ratios, each of the leading crops being shown by county groups and for the province :

Districts.	Fall Wheat.	Spring Wheat.	Barley.	Oats.	Rye.	Pease.	Corn.	Buckwheat.	Beans.	Hay.	Potatoes.	Carrots.	Turnips.	All field crops.
Lake Erie..............	108	96	76	77	85	81	107	110	122	95	94	114	105	95
Lake Huron............	115	118	84	95	98	96	101	91	98	94	96	113	116	98
Georgian Bay..........	93	93	88	105	76	100	110	112	121	105	113	113	115	102
West Midland.........	118	116	87	94	92	89	106	113	114	103	109	116	109	101
Lake Ontario..........	99	76	72	90	83	97	105	104	107	103	94	112	120	94
St. Lawrence & Ottawa.	91	72	76	92	79	101	113	112	111	82	99	120	116	88
East Midland..........	93	86	76	103	89	113	107	111	136	104	96	114	110	98
Northern Districts......	95	80	84	99	85	94	98	103	116	105	97	95	117	98
The Province.......	108	86	79	93	83	95	106	109	119	96	101	114	114	96

The highest percentage in the province in 1890 is given to beans and fall wheat, corn, buckwheat, potatoes, carrots and turnips also exceed the 100. Barley has the lowest per cent. ratio, only 79 being reached. Barley and rye failed to reach the annual average in any of the county groups, while turnips went over 100 in every district. In the West Midland group nine out of the thirteen items go over the standard, and in the Georgian Bay district eight go over and one equals the 100. Only four items show three figures in the Northern Districts. For all crops the Georgian Bay and West Midland groups exceed 100, and three others mark as high as 98 per cent. ; the least per cent. ratio is 88, in the St. Lawrence and Ottawa group.

RENTALS OF LEASED FARMS. The appended table presents by districts the average area, value and rental of such leased farms as were reported on farmers' schedules returned to this Bureau in 1890. The rental per acre is given on the bases of land occupied and land cleared. The averages of the province are given for 1890 and for the five years 1886-90 :

Districts.	Per cent. leased.	Average area of leased farms.		Average yearly rental.	Rent per acre based on—					
		Acres occupied.	Acres cleared.		Acres occupied.			Acres cleared.		
					1890.	1889.	'86-90.	1890.	1889.	'86-90.
				$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Lake Erie......	13.3	105.5	77.2	223	2 11	2 09	2 10	2 89	2 88	2 92
Lake Huron..................	11.1	112.9	86.9	212	1 88	1 79	1 91	2 44	2 51	2 63
Georgian Bay	12.5	112.8	82.9	179	1 59	1 60	1 56	2 16	2 26	2 23
West Midland................	14.2	119.6	92.0	267	2 23	2 25	2 28	2 90	2 94	3 00
Lake Ontario................	19.1	121.7	98.3	315	2 57	2 72	2 70	3 18	3 29	3 30
St. Lawrence and Ottawa.....	10.4	128.6	83.6	174	1 36	1 32	1 35	2 09	2 16	2 19
East Midland	10.4	138.9	85.5	209	1 51	1 61	1 57	2 45	2 57	2 55
Northern Districts............	5.2	205.9	49.4	84	0 41	0 51	0 44	1 70	1 70	1 75
The Province :										
1890....................	12.9	120.3	87.4	238	1 98	.....	......	2 72	.....	......
1889......	.....	....	....	....	.....	1 96	....	......	2 80	......
1886-90.................	14.1	120.3	86.5	246	....	.....	2 03	......		2 83

The percentage of farms returned as leasehold is 12.9, being a decrease of 1.2 as compared with the average for the five years. The average number of acres occupied in a leased farm is unchanged at 120.3, but there is an increase of .9 in the acreage cleared, which is now 87.4. The average yearly rental is $238, being a decrease of $8 compared with the average for the five years. The rent per acre occupied is $1.98, being 2 cents more than in 1889, and 5 cents less than the average for the five years, but the rent per acre cleared, $2.72, is 8 cents below the figure for the previous year and 11 cents lower than the average for 1886-90. The largest cleared area in this class of farms is seen in the Lake Ontario counties, in which group the highest rental per acre is also paid, and in both these respects the West Midland counties rank second. Neither of these groups, however, command as good a rental per acre as they did in the preceding year.

FARM LABOR AND WAGES.

A scarcity of farm laborers was reported in only a few localities in the spring, but a deficiency of first-class hsnds was noted, more especially of good plowmen. There was also a dearth of domestic servants in the rural sections, as the girls seems to prefer city life. The August bulletin reported the supply of farm labor about equal to the demand, and but rarely in excess of it. " Year by year the demand for outside help is gradually falling off with the more general use of binders and other labor-saving machinery, so that many farmers with their sons (if they are fortunate enough to have sons who will stay on the farm) now do the whole of the work themselves, and hardly find the work of harvest heavier than that of any other season." The crowding of the immense hay crop upon the rest of the harvest caused some scarcity in a few localities and made the work somewhat heavy for the time being, but as a general rule little difficulty has been experienced. The rate of wages has ranged from $1 to $1.50 by the day, and from $15 to $25 by the month, according to the efficiency and supply of labor. The rate was slightly lower in the eastern part of the province than elsewhere.

The November bulletin had the following :—" The situation as regards farm wages is but little changed from that of last year. The supply of labor has been on the whole adequate, except at the height of harvesting. Domestic servants are still rather scarce, urban life with its better wages and its attractive surroundings enticing the more ambitious girls from the farm. While a few correspondents express the opinion that wages are likely to fall, the bulk of the reports are to the effect that no great change need be looked for, except where influenced by local causes, such as a revival of the lumbering interest, railway building and other public improvements. Many farmers speak despondently of the situation."

WAGES OF FARM LABORERS. The following table shows the average rates of wages for farm laborers by the year and by the month, with and without board, by county groups and for the province for 1889 and 1890, together with their averages for the nine years 1882-90 ; also the average amounts paid domestic servants in 1889 and 1890 :

Districts.	Farm laborers.												Domestics per month with board.	
	Per year—						Per month in working season.							
	With board.			Without board.			With board.			Without board.				
	1890	1889	'82-90	1890	1889	'82-90	1890.	1889.	'82-90	1890.	1889.	'82-90	1890	1889
	$	$	$	$	$	$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$	$
Lake Erie........	154	160	159	247	249	249	16 65	17 19	17 42	25 94	25 45	26 33	6 40	6 93
Lake Huron	155	163	163	256	250	258	16 72	17 98	17 95	27 04	26 39	27 48	6 18	6 38
Georgian Bay....	156	160	160	257	253	255	16 73	17 44	17 84	26 23	26 66	27 39	5 77	6 33
West Midland....	157	161	161	251	245	251	16 54	17 20	17 56	26 24	25 31	26 70	6 36	6 76
Lake Ontario....	159	163	163	254	248	253	16 87	17 44	17 58	26 34	25 54	26 69	6 42	6 86
St. Law. & Ottawa	159	159	162	253	241	251	17 17	17 92	18 10	26 86	26 24	26 97	6 00	6 37
East Midland....	160	165	165	258	263	257	16 77	17 67	17 85	25 68	26 55	27 02	5 93	6 32
Nrth'rn Districts.	174	175	174	280	278	276	19 74	19 38	19 73	29 59	28 83	29 64	6 40	6 32
The Province..	157	162	162	253	249	253	16 88	17 59	17 72	26 56	26 01	27 04	6 23	6 61

The yearly rate with board for the province has fallen from the average of $162 in 1889 and 1882-90 to $157 (the average for 1888 also), but the amount without board has increased to $253, which is $4 more than in 1889, although exactly the same as the average of the province for the nine years. Monthly wages with board averaged $16.88 during the working season, a falling off of 71 cents compared with the rate in the previous year, but there has been an increase of 55 cents in the average rate of wages per month without board, although the average for 1882-90 was not equalled. The average wages of domestic servants on the farm has fallen from $6.61 in 1889 to $6.23. Save in the St. Lawrence and Ottawa counties, where the figures tied, every group exhibited a decrease in the yearly rate with board compared with their record of 1889. The Lake Erie and East Midland groups were the only districts falling below their own figures of the previous year in the yearly rate without board. The Northern Districts alone show an increase in the rate of wages per month with board, while the Georgian Bay, West Midland and Lake Ontario groups exhibit a decrease in monthly wages without board. Excepting the Northern Districts, the fall in the rate of wages of domestic servants is general.

STATISTICS OF

VALUES, RENT AND FARM WAGES.

FARM VALUES—LAND, BUILDINGS AND IMPLEMENTS.

TABLE I. Showing by County Municipalities and groups of Counties the values of Farm Land Buildings and Implements in Ontario in 1889 and 1890.

Counties.	Farm land.		Farm buildings.		Farm implements.	
	1890.	1889.	1890.	1889.	1890.	1889.
	$	$	$	$	$	$
Essex	16,585,081	16,359,666	4,226,122	4,262,194	1,234,940	1,096,392
Kent	23,777,291	23,766,542	5,503,006	5,326,115	1,555,151	1,584,155
Elgin	17,489,547	17,606,191	5,005,478	4,755,988	1,207,841	1,312,551
Norfolk	11,713,740	11,941,445	4,110,525	4,121,397	1,048,016	1,069,101
Haldimand	9,358,909	9,526,805	3,451,788	3,515,166	950,757	955,267
Welland	8,428,307	8,664,498	3,102,447	3,058,472	788,088	859,178
Totals	87,352,875	87,865,147	25,399,366	25,039,332	6,784,793	6,876,644
Lambton	20,022,595	19,865,126	4,962,205	4,633,682	1,377,776	1,310,583
Huron	29,513,722	30,148,600	8,617,158	8,351,173	2,354,921	2,397,494
Bruce	20,375,754	20,683,248	5,915,781	6,006,764	1,674,400	1,795,232
Totals	69,912,071	70,696,974	19,495,144	18,991,619	5,407,097	5,503,309
Grey	22,262,173	22,238,762	7,041,914	7,105,583	2,126,990	2,222,106
Simcoe	26,668,872	26,691,681	7,350,258	7,654,097	2,158,097	2,307,594
Totals	48,931,045	48,930,443	14,392,172	14,759,680	4,285,087	4,529,700
Middlesex	34,925,968	35,459,934	10,231,305	10,276,374	2,505,058	2,485,829
Oxford	22,356,395	22,938,421	7,334,038	7,077,071	1,577,461	1,591,264
Brant	10,253,987	10,670,935	3,837,380	3,748,820	813,005	826,939
Perth	20,184,159	22,118,289	6,513,584	6,606,954	1,711,863	1,742,971
Wellington	21,120,421	21,774,648	6,859,654	7,071,961	1,679,613	1,936,157
Waterloo	13,696,727	14,409,922	4,846,400	4,773,232	1,150,671	1,186,659
Dufferin	9,145,055	9,015,108	2,473,042	2,607,350	727,252	709,032
Totals	131,682,712	136,387,257	42,095,403	42,161,762	10,164,923	10,478,851
Lincoln	8,938,290	8,885,403	3,453,792	3,519,861	741,425	832,883
Wentworth	13,625,007	13,860,384	4,695,485	4,811,264	1,104,829	1,199,717
Halton	9,989,717	9,231,520	3,445,730	3,218,964	783,141	754,617
Peel	13,878,876	14,218,973	4,549,242	4,773,029	1,041,939	1,121,742
York	31,930,300	29,915,054	9,111,861	8,187,700	2,019,768	2,140,772
Ontario	19,404,819	20,682,965	6,223,752	5,950,238	1,533,199	1,522,000
Durham	15,043,081	16,901,141	4,854,750	4,363,883	1,095,288	1,168,638
Northumberland	14,334,306	15,993,842	5,149,288	5,410,876	1,346,999	1,336,511
Prince Edward	8,725,064	9,214,982	2,970,483	3,105,068	842,136	788,027
Totals	135,869,460	138,904,264	44,454,383	43,340,883	10,508,724	10,864,907
Lennox and Addington	9,455,784	10,270,957	2,998,745	3,531,754	777,704	796,799
Frontenac	8,486,769	9,446,098	3,018,113	2,968,677	751,002	900,764
Leeds and Grenville	18,565,738	18,396,123	7,026,849	6,508,528	1,691,578	1,657,423
Dundas	7,783,443	8,573,212	2,649,191	2,915,796	690,360	694,875
Stormont	5,820,418	6,170,322	2,133,567	2,089,032	567,921	583,996
Glengarry	7,109,229	7,805,957	2,551,557	2,543,421	760,977	696,648
Prescott	7,074,698	6,651,234	1,969,640	2,033,614	591,081	621,669
Russell	4,298,201	4,180,338	1,165,330	1,443,003	448,044	344,522
Carleton	18,178,141	16,179,566	5,030,330	4,804,864	1,304,938	1,331,767
Renfrew	7,316,604	7,123,449	2,464,751	2,588,078	907,811	934,024
Lanark	9,705,385	9,280,306	3,483,304	3,300,732	927,273	933,871
Totals	103,794,410	104,077,562	34,491,377	34,727,499	9,418,689	9,496,358
Victoria	12,077,621	12,834,370	3,269,940	3,183,917	1,026,237	1,005,748
Peterborough	10,638,657	10,895,756	3,027,443	3,469,814	797,050	891,318
Haliburton	992,536	911,515	269,547	267,058	81,341	80,803
Hastings	15,753,832	16,086,790	4,926,947	5,316,672	1,479,376	1,516,777
Totals	39,462,646	40,728,431	11,493,877	12,237,461	3,384,004	3,494,646
Muskoka	2,119,171	2,018,301	623,276	609,246	195,439	216,490
Parry Sound	1,476,517	1,059,968	340,409	224,559	133,301	90,199
Nipissing	436,670	....	104,050	....	27,947	....
Algoma	1,848,423	1,661,086	549,369	372,196	205,579	134,602
Totals	5,880,781	4,739,355	1,617,104	1,206,001	562,266	441,291
The Province	622,886,000	632,329,433	193,438,826	192,464,237	50,515,583	51,685,706

FARM VALUES—LIVE STOCK AND TOTAL PROPERTY—RENTALS.

TABLE II. Showing by County Municipalities and groups of Counties the values of Farm Live Stock and Total Farm property in Ontario in 1889 and 1890; also the rent per acre of leased farms as reported in 1889 and 1890.

Counties.	Farm live stock.		Total farm property.		Rent per acre on land.			
					Occupied.		Cleared.	
	1890.	1889.	1890.	1889.	1890.	1889.	1890.	1889.
	$	$	$	$	$ c.	$ c.	$ c.	$ c.
Essex	2,522,114	2,352,893	24,568,257	24,071,145	2 14	1 85	3 36	2 97
Kent	3,492,894	3,261,733	34,328,342	33,938,545	2 48	2 55	3 57	3 47
Elgin	2,856,740	2,676,418	26,559,606	26,351,148	2 27	2 14	3 11	2 89
Norfolk	1,791,306	1,940,819	18,663,587	19,072,762	1 74	1 86	2 27	2 73
Haldimand	1,763,491	1,796,454	15,524,945	15,793,692	1 75	1 80	2 23	2 30
Welland	1,395,900	1,429,022	13,714,742	14,011,170	2 08	1 94	2 57	2 45
Totals	13,822,445	13,457,339	133,359,479	133,238,462	2 11	2 09	2 89	2 88
Lambton	3,127,010	2,903,227	29,489,586	28,712,618	1 91	1 74	2 69	2 76
Huron	5,572,443	5,630,301	46,058,244	46,527,568	2 04	1 97	2 53	2 56
Bruce	3,912,542	4,104,874	31,878,477	32,590,118	1 65	1 66	2 16	2 30
Totals	12,611,995	12,638,402	107,426,307	107,830,304	1 88	1 79	2 44	2 51
Grey	4,796,716	4,903,497	36,227,793	36,469,948	1 34	1 27	1 89	1 89
Simcoe	3,987,536	4,318,500	40,164,763	40,971,872	2 01	1 88	2 58	2 58
Totals	8,784,252	9,221,997	76,392,556	77,441,820	1 59	1 60	2 16	2 26
Middlesex	6,015,884	5,547,893	53,678,215	53,770,030	2 61	2 56	3 31	3 30
Oxford	3,802,970	3,548,079	35,070,864	35,154,835	2 56	2 67	3 32	3 50
Brant	1,579,562	1,598,778	16,483,934	16,845,472	2 45	2 70	3 06	3 28
Perth	3,744,405	3,821,420	32,154,011	34,289,634	2 12	2 34	2 58	2 97
Wellington	3,896,118	4,078,722	33,555,806	34,861,488	1 94	2 05	2 48	2 58
Waterloo	2,085,930	2,093,426	21,779,728	22,463,239	2 23	2 19	2 89	2 74
Dufferin	1,541,638	1,520,068	13,886,987	13,851,558	1 50	1 43	2 28	2 10
Totals	22,666,507	22,208,386	206,609,545	211,236,256	2 23	2 25	2 90	2 94
Lincoln	1,291,989	1,383,222	14,425,496	14,621,369	2 16	2 39	2 66	2 88
Wentworth	2,066,779	2,055,322	21,492,100	21,926,687	2 73	2 69	3 62	3 39
Halton	1,574,947	1,434,442	15,793,535	14,639,543	2 34	2 32	2 98	3 01
Peel	1,952,499	2,145,357	21,422,556	22,259,101	2 62	2 82	3 10	3 44
York	4,251,109	4,103,439	47,313,038	44,346,965	3 15	3 03	3 96	3 63
Ontario	3,446,651	3,384,931	30,608,421	31,540,134	2 86	2 78	3 55	3 39
Durham	2,222,885	2,328,347	23,216,004	24,762,009	2 61	2 98	3 22	3 53
Northumberland	2,302,157	2,543,224	23,132,750	25,284,453	1 87	2 09	2 24	2 56
Prince Edward	1,365,200	1,420,607	13,902,883	14,528,684	1 91	2 34	2 46	2 95
Totals	20,474,216	20,798,891	211,306,783	213,908,945	2 57	2 72	3 18	3 29
Lennox and Addington	1,415,328	1,678,187	14,647,561	16,277,697	1 40	1 33	2 23	2 12
Frontenac	1,556,158	1,764,648	13,812,042	15,080,187	1 46	1 24	1 97	1 97
Leeds and Grenville	3,274,861	3,383,691	30,559,026	29,945,765	1 24	1 27	1 92	2 18
Dundas	1,170,348	1,337,545	12,293,342	13,521,428	1 75	1 81	2 46	2 63
Stormont	1,069,731	1,154,348	9,591,637	9,997,698	1 46	1 43	2 40	2 00
Glengarry	1,313,884	1,467,639	11,735,647	12,513,665	1 27	1 37	1 95	2 42
Prescott	1,089,364	1,147,800	10,724,783	10,454,317	1 64	1 49	2 08	2 20
Russell	771,052	705,147	6,682,627	6,673,010	1 69	1 20	2 31	2 01
Carleton	2,460,954	2,516,289	26,974,363	24,832,486	1 54	2 09	2 58	2 82
Renfrew	2,108,768	2,026,273	12,797,934	12,671,824	0 82	0 78	1 90	1 74
Lanark	1,799,258	1,917,772	15,915,220	15,432,681	0 69	0 93	1 12	1 45
Totals	18,029,706	19,099,339	165,734,182	167,400,758	1 36	1 32	2 09	2 16
Victoria	1,924,849	2,097,424	18,298,647	19,121,459	1 71	1 88	2 72	2 78
Peterborough	1,561,176	1,707,348	16,024,326	16,964,236	1 50	1 39	2 27	2 25
Haliburton	243,032	208,436	1,586,456	1,467,812	0 40	0 30	1 46	1 53
Hastings	2,703,407	3,295,860	24,863,562	26,216,099	1 72	1 75	2 51	2 60
Totals	6,432,464	7,309,068	60,772,991	63,769,606	1 51	1 61	2 45	2 57
Muskoka	457,215	468,283	3,395,101	3,312,320	0 36	0 30	1 59	1 51
Parry Sound	323,189	214,402	2,273,416	1,589,128	0 38	0 47	1 67	1 75
Nipissing	77,892	....	646,559	....	0 55	......	2 16	....
Algoma	406,745	315,181	3,010,116	2,483,065	0 45	0 81	1 58	1 85
Totals	1,265,041	997,866	9,325,192	7,384,513	0 41	0 51	1 70	1 70
The Province	104,086,626	105,731,288	970,927,035	982,210,664	1 98	1 96	2 72	2 80

FARM VALUES—AVERAGE PER ACRE.

TABLE III. Showing by County Municipalities and groups of Counties the average value per acre occupied of Farm Land, Buildings, Implements and Live Stock in Ontario for the years 1889 and 1890.

Counties.	Lands.		Buildings.		Implements.		Live Stock.		Total Property.	
	1890.	1889.	1890.	1889.	1890.	1889.	1890.	1889.	1890.	1889.
		$ c.		$ c.		$ c.		$ c.		$ c.
Essex	38 56	37 99	9 82	9 90	2 87	2 55	5 86	5 46	57 11	55 90
Kent	42 19	41 69	9 76	9 34	2 76	2 78	6 20	5 72	60 91	59 53
Elgin	39 97	40 38	11 44	10 91	2 76	3 01	6 53	6 14	60 70	60 44
Norfolk	29 49	30 11	10 35	10 39	2 64	2 70	4 51	4 89	46 99	48 09
Haldimand	33 40	33 89	12 32	12 51	3 39	3 40	6 30	6 39	55 41	56 19
Welland	37 11	37 85	13 66	13 36	3 47	3 75	6 14	6 24	60 38	61 20
Group	37 40	37 50	10 87	10 69	2 90	2 93	5 92	5 74	57 09	56 86
Lambton	30 35	30 05	7 52	7 01	2 09	1 98	4 74	4 39	44 70	43 43
Huron	36 94	37 71	10 79	10 45	2 95	3 00	6 97	7 04	57 65	58 20
Bruce	25 05	25 55	7 27	7 42	2 06	2 22	4 81	5 07	39 19	40 26
Group	30 73	31 14	8 57	8 37	2 38	2 42	5 54	5 57	47 22	47 50
Grey	21 02	21 00	6 65	6 71	2 01	2 10	4 53	4 63	34 21	34 44
Simcoe	27 97	27 65	7 71	7 93	2 26	2 39	4 18	4 47	42 12	42 44
Group	24 31	24 17	7 15	7 29	2 13	2 24	4 37	4 56	37 96	38 26
Middlesex	46 15	46 77	13 52	13 55	3 31	3 28	7 95	7 32	70 93	70 92
Oxford	47 41	48 57	15 55	14 99	3 35	3 37	8 06	7 51	74 37	74 44
Brant	47 46	49 54	17 76	17 40	3 77	3 84	7 31	7 42	76 30	78 20
Perth	38 98	42 68	12 58	12 75	3 30	3 36	7 23	7 38	62 09	66 17
Wellington	33 66	34 74	10 93	11 28	2 68	3 09	6 21	6 51	53 48	55 62
Waterloo	44 75	47 07	15 84	15 59	3 76	3 87	6 82	6 84	71 17	73 37
Dufferin	25 79	25 50	6 98	7 37	2 05	2 00	4 35	4 30	39 17	39 17
Group	40 52	41 96	12 95	12 97	3 13	3 22	6 97	6 83	63 57	64 98
Lincoln	46 66	46 64	18 03	18 48	3 87	4 37	6 74	7 26	75 30	76 75
Wentworth	49 83	50 83	17 17	17 65	4 04	4 40	7 56	7 54	78 60	80 42
Halton	44 65	41 14	15 40	14 35	3 50	3 36	7 04	6 39	70 59	65 24
Peel	48 16	49 43	15 78	16 59	3 62	3 90	6 77	7 46	74 33	77 38
York	59 73	55 70	17 04	15 24	3 78	3 99	7 95	7 64	88 50	82 57
Ontario	38 91	41 30	12 48	11 88	3 07	3 04	6 91	6 75	61 37	62 97
Durham	40 80	45 89	13 16	11 85	2 97	3 17	6 03	6 32	62 96	67 23
Northumberland	33 04	36 63	11 87	12 39	3 10	3 06	5 31	5 82	53 32	57 90
Prince Edward	37 67	39 82	12 82	13 42	3 64	3 41	5 89	6 14	60 02	62 79
Group	44 63	45 55	14 60	14 21	3 45	3 56	6 72	6 82	69 40	70 14
Lennox and Addington	22 79	24 88	7 23	8 55	1 88	1 93	3 41	4 07	35 31	39 43
Frontenac	12 51	13 92	4 45	4 37	1 11	1 33	2 29	2 60	20 36	22 22
Leeds and Grenville	25 07	24 72	9 49	8 75	2 28	2 23	4 42	4 55	41 26	40 25
Dundas	32 83	36 22	11 18	12 32	2 91	2 93	4 94	5 65	51 86	57 12
Stormont	23 14	24 95	8 48	8 45	2 26	2 36	4 25	4 67	38 13	40 43
Glengarry	24 74	27 04	8 88	8 81	2 65	2 41	4 57	5 09	40 84	43 35
Prescott	24 78	23 28	6 90	7 12	2 07	2 18	3 81	4 02	37 56	36 60
Russell	17 02	16 63	4 61	5 74	1 78	1 37	3 05	2 81	26 46	26 55
Carleton	32 36	28 75	8 95	8 54	2 32	2 37	4 38	4 47	48 01	44 13
Renfrew	8 18	7 91	2 76	2 87	1 01	1 04	2 36	2 25	14 31	14 07
Lanark	14 50	13 88	5 20	4 94	1 39	1 40	2 69	2 87	23 78	23 09
Group	19 68	19 72	6 54	6 58	1 79	1 80	3 42	3 62	31 43	31 72
Victoria	21 16	22 59	5 73	5 60	1 80	1 77	3 37	3 69	32 06	33 65
Peterborough	19 66	19 94	5 60	6 35	1 47	1 63	2 89	3 12	29 62	31 04
Haliburton	1 77	1 64	0 48	0 48	0 14	0 14	0 43	0 37	2 82	2 63
Hastings	16 15	16 33	5 05	5 40	1 52	1 54	2 77	3 35	25 49	26 62
Group	14 89	15 33	4 34	4 61	1 28	1 31	2 43	2 75	22 94	24 00
Muskoka	4 11	3 92	1 21	1 18	0 38	0 42	0 89	0 91	6 59	6 43
Parry Sound	3 24	3 09	0 75	0 66	0 29	0 26	0 71	0 63	4 99	4 64
Nipissing	3 05	....	0 73	....	0 19	......	0 54	....	4 51	....
Algoma	4 22	5 00	1 25	1 12	0 47	0 41	0 93	0 95	6 87	7 48
Group	3 73	3 99	1 02	1 01	0 36	0 37	0 80	0 84	5 91	6 21
The Province	27 79	28 66	8 63	8 73	2 25	2 34	4 64	4 79	43 31	44 52

MARKET PRICES.

TABLE IV. Showing the average price of Agricultural Products at the leading markets of Ontario for July-December, 1890, and the average for the half year, and for the Province.

Products.	Belleville.	Brantford.	Brockville.	Chatham.	Cobourg.	Guelph.	Kingston.	Lindsay.	London.	Ottawa.	Peterborough.	St. Thomas.	Stratford.	Toronto.	The Province.
FALL WHEAT: per bush.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
July	75.0	91.2	100.0	88.4	....	95.0	96.9	92.5	94.5	102.7	93.1	93.5	95.0	98.1	95.6
August	80.8	88.0	100.0	93.0	....	94.8	100.1	92.5	93.3	105.0	93.0	92.7	93.8	96.8	94 8
September	80.8	94.0	100.0	94.0	....	94.8	93.9	95.0	94.0	100.0	98.8	96.5	92.8	99.0	96.0
October	81.3	89.4	97.0	90.6	91.0	93.0	94.9	97.0	90.0	102.5	95.4	92.3	92.5	94.7	93.3
November	95.5	92.0	95.0	92.5	91.0	92.3	92.5	97.5	91.9	97.5	95.7	91.6	93.3	96.3	94.3
December	95.5	89.4	95.0	88.8	87.5	90.0	92.3	93.8	88.1	95.9	90.0	88.4	88.4	94.0	91.5
Average.....	84.8	90.6	97.7	91.3	89.4	93.3	95.2	94.7	91.9	101.0	94.5	91.7	92.7	96.5	94.2
SPRING WHEAT: per bush.															
July	95.8	91.5	100.0	...	....	90.0	95.1	87.0	93.3	102.7	89.9	...	95.0	92.6	93.4
August	93.8	86.6	100.0	..	....	89.6	99.3	87.6	93.4	105.0	91.6	....	93.8	89.3	92.0
September	92.5	91.8	100.0	91.3	....	89.1	94.4	90.0	94.0	100.0	95.5	....	92.8	90.6	92.4
October	91.7	88.3	97.0	88.3	90.0	88.0	91.8	88.6	89.4	102.5	92.9	....	92.5	89.2	90.4
November	96.5	92.0	95.0	91.8	87.4	87.3	91.7	89.0	91.3	97.5	92.9	....	93.3	93.3	92.4
December	96.5	89.3	95.0	87.8	84.6	85.0	90.1	81.5	88.0	96.9	86.2	....	88.1	86.3	87.9
Average.....	94.3	89.7	97.7	89.9	86.4	88.2	93.7	87.3	91.5	101.1	91.7	....	92.7	90.1	91.3
BARLEY: per bush.															
July	40.0	44.7	49.3	39.9	....	37.5	43.5	37.5	42.0	46.8	37.0	47.5	40 3	50.1	45.3
August	43.1	45.5	51.0	39.6	....	41.3	50.8	37.5	44.9	47.5	38.5	47.5	40.9	50.2	46.9
September	52.5	54.2	51.0	47.5	....	53.4	59.9	46.7	47.8	45.0	46.5	47.5	41.3	61.0	54.5
October	55.0	50.7	48.9	40.8	55.0	52.4	58.4	46 0	43.5	47.5	50.7	47.5	43.0	57.7	51.7
November	56.5	54.1	47.5	40.3	50.5	53.0	54.8	50.0	47.8	51.7	47.4	48.1	49.8	56.7	52.1
December	56.5	53.7	47.5	39.7	46.5	49.0	50.3	50.0	51.8	53.1	48.2	48.3	43.8	50.8	50.4
Average.....	51.0	50.3	49.2	41.6	49.2	47.5	53.5	44.9	46.3	48.6	46.0	47.9	43.0	54.4	50.2
OATS: per bush.															
July	40.2	38.4	42.0	40.7	....	38.0	38.1	37.0	40.8	45.6	37.8	45.0	39.9	44.6	42.0
August........	37.4	40.0	43.5	40.6	....	40.4	41.6	39.6	41.4	47.9	40.8	44.5	39.9	46.2	43.4
September	38.5	34 9	38.5	35.8	....	38.5	35.6	34.5	38.6	39.1	37.0	42.5	33.9	43.0	39.6
October	37.7	35.5	42.3	38.3	39.0	36.5	36.5	36.0	36.3	38.6	38.2	42.5	35.0	42.3	40.3
November	36.2	39.9	43.8	39.1	37.3	36.5	37.3	35.8	40.5	39.7	39.5	39.4	38.0	44.2	41.0
December	36.5	40.6	43.5	38.5	39.0	40.8	39.8	36.8	39.6	41.9	42.0	37.8	39.5	45.3	41.7
Average.....	37.7	38.1	42.3	38.7	38.2	38.3	38.2	36.7	39.6	42.7	39.1	41.0	37.7	44.3	41.1
RYE: per bush.															
July	42.5	45.0	50.0	....	....	43.1	45.0	39.0	56.0	42.5	40.0	....	.. .	47.8	49.2
August	44.4	....	50.0	......	....	42.0	53.0	40.0	56.0	......	.. .	....	....	46.0	50.1
September	51.8	45.0	50.0	......	....	42.5	50.8	42.5	57.3	......	41.0	....	....	....	52.0
October	54.0	53.0	51.5	......	55.0	42.5	57.3	45.0	55.1	......	46.8	....	. ..	53.7	52.6
November	60.0	......	52.5	....	54.3	49.6	57.6	55.0	53.7	......	54.0	....	....	56.9	55.1
December	60.0	......	52.5	......	55.0	52.0	56.5	55.0	55.6	.....	....	....	....	57.4	56.2
Average.....	52.4	48.2	51.1	......	54.7	45.1	53.7	45.8	55.6	42.5	46.4	....	....	53.1	52.7
PEASE: per bush.															
July	56.0	55.3	71.7	57.5	....	56.6	60.4	61.5	56.4	61.3	59.6	57.5	61.3	59 4	58.8
August.......	56.8	56.8	70.0	50.6	....	56.0	63.7	61.5	55.7	62.5	59.5	54.2	60.9	61.8	59.1
September	57.5	60.8	70.0	52.5	...	60.5	60.3	62.0	60.4	60.0	60.0	52.5	59.0	65.2	62.0
October	59.0	58.3	62.5	51.7	59.0	58.5	61.3	62.5	59.2	61.3	59.7	57.5	57.8	62.4	60.3
November.....	57.5	58.8	57.5	53.3	57.4	57.5	61.0	55.0	58.5	62.5	60.0	59.4	59.6	64.3	60.4
December	57.5	59.4	62.5	54.2	57.5	59.4	60.9	55.0	60.9	60.0	62.4	60.0	60.3	62.5	60.7
Average.....	57.3	58.2	65.3	52.9	57.6	58.0	61.2	60.6	58.5	61.3	60.2	57.1	59.8	62.8	60.3

TABLE IV. MARKET PRICES.—*Continued.*

Products.	Belleville.	Brantford.	Brockville.	Chatham.	Cobourg.	Guelph.	Kingston.	Lindsay.	London.	Ottawa.	Peterborough.	St. Thomas.	Stratford.	Toronto.	The Province.
CORN: (in ear) per bush.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.	cts.
October.......	34.0	27.8	......	24.4	....	....	33.2	....	31.3	33.1	....	32.5	....	....	30.7
November	....	28.3	......	24.1	....	...	35.0	....	29.5	33.8	....	31.6	....	....	29.8
December.....	....	28.3	......	24.2	....	....	35.9	....	31.0	33.5	....	31.3	....	....	31.0
Average.....	34.0	28.1	......	24.2	....	....	34.9	....	30.6	33.5	....	31.7	....	....	30.5
BUCKWHEAT: per bush.															
October ..	....	45.0	44.5	.....	35.0	....	25.3	35.0	46.1	.....	....	....	....	....	42.2
November	....	.....	40.0	......	35.5	....	40.0	30.0	45.4	.....	....	....	....	....	42.8
December.....	....	......	42.5	....	36.5	....	38.2	30.0	48.1	.....	....	....	....	....	43.8
Average.....	....	45.0	42.5	......	35.9	....	34.3	32.5	46.6	.....	....	....	....	....	43.0
BEANS: per bush.															
October.......	....	112.5	175.0	111.7	....	....	......	....	127.0	.....	....	....	....	....	132.4
November. ...	...	......	175.0	105.0	....	....	......	....	122.5	.....	....	....	....	....	126.9
December.....	....	.....	203.1	103.8	....	....	......	....	116.6	.....	....	....	....	....	126.3
Average.....	....	112.5	183.7	106.9	....	....	......	....	121.8	.....	....	....	....	....	128.5
POTATOES: per bush.															
October.......	48.3	50.7	39.3	51.2	....	35.3	48.3	29.5	46.7	32.9	42.0	50.0	34.7	45.1	43.8
November	43.3	47.2	40.6	47.5	32.5	35.0	45.6	27.5	41.4	34.1	36.8	47.6	35.0	44.9	41.9
December.....	43.3	48.0	45.0	51.8	33.3	38.8	48.7	30.0	40.1	40.6	....	47.3	36.6	54.7	47.0
Average.....	44.7	49.1	41.5	49.9	32.9	36.3	47.8	29.0	42.6	35.6	40.5	47.8	35.4	48.4	44.3
CARROTS: per bush.															
October.......	....	40.0	45.0	....	30.0	....	33.3	....	35.0	......	....	....	....	28.8	33.1
November	....	......	45.0	.....	37.5	....	33.3	....	27.5	24.5	....	....	....	33.7	32.0
December.....	....	.....	45.0	.....	....	....	33.3	....	26.3	25.0	....	....	....	30.9	30.1
Average.....	....	40.0	45.0	......	36.0	....	33.3	....	29.4	24.7	....	....	....	31.2	31.5
TURNIPS: per bush.															
October	....	15.0	32.5	......	20.0	17.5	33.3	....	25.0	......	....	....	....	27.7	26.7
November	....	.....	28.8	......	18.8	11.1	33.3	....	25.0	17.8	....	....	....	24.5	24.0
December.....	....	.....	27.5	.....	....	9.0	33.3	....	34.2	18.3	...	....	....	22.6	26.0
Average.....	....	15.0	29.8	......	19.0	12.9	33.3	....	28.3	18.0	....	....	....	24.9	25.6
WOOL: per lb.															
July	....	19.8	19.0	19.5	....	21.3	19.0	19.0	21.3	17.9	20.0	19.0	....	23.0	20.6
August	....	20.2	19.0	19 7	....	21.3	19.0	19.0	21.0	18.3	....	....	....	23.6	21.0
September	....	20.0	19.0	20.0	....	21.3	19.0	19.0	19.0	19.0	19.0	....	....	23.1	20.4
October	19.0	19.4	19.0	19.0	....	21.3	19.0	19.0	19.5	19.0	19.0	....	....	22.9	20.5
November	23.5	20.7	19.0	20.5	....	21.3	18.4	19.0	18.5	19.0	19.0	....	....	23.0	20.5
December.....	23.5	20.2	19.0	19.5	....	21.3	17.8	19.0	18.0	18.6	....	....	....	23.1	20.1
Average.....	23.0	20.0	19.0	19.6	....	21.3	18.7	19.0	19.7	18.5	19.1	19.0	....	23.1	20.5
HAY: per ton.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
July	6 75	6 81	8 50	7 75	....	6 60	8 25	7 25	7 46	10 80	....	7 00	6 40	9 93	8 69
August	6 33	6 46	7 13	6 75	....	6 50	8 38	6 50	7 53	8 91	...	6 50	5 50	8 78	7 88
September	6 50	6 55	7 50	7 00	....	7 00	6 92	6 50	7 47	8 67	8 00	6 50	5 25	9 00	7 96
October.......	6 75	7 10	7 50	7 00	....	7 50	7 00	6 50	7 40	9 21	7 40	6 50	4 85	9 08	8 06
November	6 00	6 25	7 50	6 67	....	7 25	6 67	6 50	7 39	9 14	6 50	6 63	5 38	8 96	7 90
December.....	6 00	6 31	6 50	.....	....	6 50	5 50	6 50	6 56	9 00	...	6 65	5 50	8 17	7 21
Average.....	6 38	6 65	7 40	6 94	....	6 90	6 61	6 62	7 29	9 40	7 33	6 62	5 49	8 99	7 95

VALUES—FALL AND SPRING WHEAT.

TABLE V. Showing by County Municipalities and groups of Counties the value at market prices of the total crop of Fall and Spring Wheat in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90.

Counties.	Fall wheat.			Spring wheat.		
	1890.	1889.	1882-90.	1890.	1889.	1882-90.
	$	$	$	$	$	$
Essex	403,403	406,676	543,923	35,299	7,896	21,724
Kent	909,200	742,660	1,026,539	133,731	33,133	47,132
Elgin	788,128	556,238	756,994	21,371	6,532	21,458
Norfolk	581,870	407,017	520,783	9,619	5,311	9,991
Haldimand	417,047	425,283	463,285	73,970	20,357	38,128
Welland	325,292	251,341	314,515	9,631	2,364	16,778
Totals	3,424,940	2,789,215	3,626,039	283,621	75,593	155,211
Lambton	514,298	539,359	581,166	97,855	20,083	78,190
Huron	932,124	639,448	1,133,720	139,578	25,795	193,491
Bruce	670,253	422,891	806,228	191,067	85,462	163,968
Totals	2,116,675	1,601,698	2,521,114	428,500	131,340	435,649
Grey	314,543	294,444	472,523	409,628	252,528	513,564
Simcoe	822,005	887,419	997,260	443,186	397,429	470,791
Totals	1,136,548	1,181,863	1,469,783	852,814	649,957	984,355
Middlesex	1,286,618	777,286	1,265,064	77,964	16,284	131,092
Oxford	754,238	515,250	684,479	107,328	22,158	125,857
Brant	441,436	303,205	473,888	24,117	733	14,678
Perth	600,339	467,593	761,198	157,273	28,079	157,069
Wellington	217,741	224,018	441,993	334,649	108,509	263,164
Waterloo	656,169	539,738	713,160	43,393	5,089	62,780
Dufferin	83,905	59,169	171,126	344,303	194,959	266,927
Totals	4,040,446	2,886,259	4,510,908	1,089,027	375,811	1,021,567
Lincoln	299,796	296,914	336,296	31,952	10,405	27,186
Wentworth	382,651	324,450	484,510	67,043	10,308	34,829
Halton	245,433	400,640	363,205	111,127	37,594	52,688
Peel	271,964	383,016	472,479	313,881	123,578	198,668
York	484,239	564,785	699,954	390,419	282,073	396,414
Ontario	82,937	83,038	181,647	491,682	600,793	705,614
Durham	87,512	75,287	68,014	346,262	343,816	533,250
Northumberland	247,378	209,572	206,893	288,022	179,484	341,905
Prince Edward	72,473	37.055	36,595	81,078	34,703	78,859
Totals	2,174,383	2,374,757	2,849,593	2,121,466	1,622,754	2,369,413
Lennox and Addington	47,447	43,790	34,362	61,219	31,271	76,503
Frontenac	10,256	13,478	28,150	90,094	81,218	114,146
Leeds and Grenville.	38,258	60,307	82,023	116,733	108,721	180,664
Dundas	4,027	6,398	17,985	51,457	45,327	74,371
Stormont	1,436	2,184	10,339	51,317	51,286	70,254
Glengarry	766	1,655	8,434	83,650	91,597	111,609
Prescott	509	....	836	111,669	71,723	113,067
Russell	558	3,748	3,524	44,191	42,481	59,354
Carleton	14,072	5,902	20,826	245.839	308,226	324,921
Renfrew	7,481	4,464	15,650	297,391	404,856	358,356
Lanark	25,839	62,596	54,075	131,711	137,422	187,155
Totals	150,649	204,522	276,204	1,285,251	1,374,128	1,670.400
Victoria	40.716	67,723	140,408	417,837	321,422	432,530
Peterborough	125,140	141,962	178,693	306,286	245,963	305,898
Haliburton	3,472	2,845	1,928	19,483	17,971	15,691
Hastings	211,644	233,593	160,785	111,778	103,829	201,156
Totals	380,972	446,123	481,814	855,384	689,185	955,275
Muskoka	452	1,640	1,012	15,110	10,616	18,354
Parry Sound	1,849	398	702	12,001	6,567	19,974
Nipissing	260	....	29	3,395	... .	377
Algoma	12,701	7,173	8,146	68,836	83,729	107,430
Totals	15,262	9,211	9,889	99,342	100,912	146,135
The Province	13,439,875	11,493,648	15,745,344	7,015,405	5,019,680	7,738,005

VALUES—BARLEY AND OATS.

TABLE VI. Showing by County Municipalities and groups of Counties the value at market prices of the total crop of Barley and Oats in Ontario in the years 1889 and 1890, with the yearly average for the nine years 1882-90.

Counties.	Barley.			Oats.		
	1890.	1889.	1882-90.	1890.	1889.	1882-90.
	$	$	$	$	$	$
Essex	89,163	45,480	46,301	431,053	353,601	413,531
Kent	105,287	111,091	99,603	413,251	425,705	465,432
Elgin	95,834	50,072	70,743	364,447	359,753	438,519
Norfolk	65,402	61,844	87,172	247,459	217,625	305,660
Haldimand	99,873	126,548	175,563	207,904	243,416	268,685
Welland	29,614	29,532	48,436	156,549	204,537	218,011
Totals	485,173	424,567	527,818	1,820,663	1,804,637	2,109,838
Lambton	181,047	171,339	211,650	552,445	458,485	521,780
Huron	411,322	379,110	419,953	1,213,459	974,191	1,030,457
Bruce	217,784	212,832	272,921	908,722	591,517	712,101
Totals	810,153	763,281	904,524	2,674,626	2,024,193	2,264,338
Grey	198,940	194,975	306,632	1,244,559	1,039,745	1,011,762
Simcoe	362,904	480,549	438,940	942,316	879,850	781,930
Totals	561,844	675,524	745,572	2,186,875	1,919,595	1,793,692
Middlesex	218,332	177,871	225,161	1,036,743	937,841	997,628
Oxford	227,532	228,622	281,348	711,492	699,433	727,303
Brant	271,144	315,010	281,713	241,502	204,789	237,472
Perth	258,164	237,910	288,605	1,001,314	825,606	834,172
Wellington	467,966	580,939	552,434	1,219,876	1,079,374	950,226
Waterloo	310,757	302,261	285,574	540,964	461,573	482,457
Dufferin	156,900	152,341	166,639	434,450	363,962	362,816
Totals	1,910,795	1,994,954	2,081,474	5,186,341	4,572,578	4,592,074
Lincoln	50,961	51,418	60,580	172,128	163,019	210,834
Wentworth	168,477	191,893	201,026	322,939	289,543	374,700
Halton	144,793	213,498	203,051	257,352	254,791	245,933
Peel	434,507	588,113	538,021	454,503	436,446	397,206
York	561,135	948,234	904,124	999,997	888,404	911,346
Ontario	360,136	645,144	603,028	681,864	744,749	671,608
Durham	326,354	674,200	677,231	385,655	406,177	426,865
Northumberland	288,091	513,980	552,858	357,541	315,024	320,050
Prince Edward	310,302	468,010	454,278	155,414	122,294	134,422
Totals	2,644,756	4,294,490	4,194,197	3,787,393	3,620,447	3,692,964
Lennox and Addington	224,532	418,027	472,278	231,076	226,042	224,867
Frontenac	118,873	181,293	228,083	288,808	281,699	280,550
Leeds and Grenville	76,079	109,720	147,217	682,705	680,801	736,612
Dundas	54,377	60,120	108,715	310,109	298,190	371,189
Stormont	37,149	21,711	36,364	257,112	217,202	298,002
Glengarry	25,254	25,651	28,023	286,875	265,473	341,151
Prescott	55,275	47,867	42,710	325,032	234,963	289,916
Russell	26,324	23,267	20,265	269,952	158,900	210,824
Carleton	116,441	119,345	125,974	746,431	659,092	747,988
Renfrew	15,949	28,164	19,061	478,300	601,231	459,081
Lanark	37,823	48,098	40,995	451,739	383,636	407,821
Totals	788,076	1,083,263	1,269,685	4,328,139	4,017,229	4,368,001
Victoria	283,742	441,651	421,601	521,710	515,951	461,551
Peterborough	79,954	165,132	176,404	361,999	372,110	333,530
Haliburton	3,139	3,074	3,645	64,107	66,167	50,010
Hastings	239,903	429,311	490,526	461,244	488,440	438,368
Totals	606,738	1,039,168	1,092,176	1,409,060	1,442,668	1,283,459
Muskoka	5,703	4,128	6,295	115,426	104,438	92,287
Parry Sound	8,262	4,421	8,144	80,571	50,074	53,349
Nipissing	2,172	....	241	20,155	....	2,240
Algoma	7,613	6,215	8,234	78,485	69,763	58,473
Totals	23,750	14,764	22,914	294,637	224,275	206,349
The Province	7,831,285	10,290,011	10,838,360	21,687,734	19,625,622	20,310,715

VALUES—RYE AND PEASE.

TABLE VII. Showing by County Municipalities and groups of Counties the value at market prices of the total crop of Rye and Pease in Ontario in the years 1889 and 1890, with the yearly avarage for the nine years 1882-90.

Counties.	Rye.			Pease.		
	1890.	1889.	1882-90.	1890.	1889.	1882-90.
	$	$	$	$	$	$
Essex	7,821	8,065	9.210	41,603	33,071	44,131
Kent	16,971	9,026	8,785	116,284	137,278	122,414
Elgin	9,998	18,016	13,577	150,324	128,301	140,503
Norfolk	65,527	39,117	61,227	230,027	209,521	183,396
Haldimand	4,161	2,380	8,026	174,504	137,683	153,956
Welland	1,921	5,416	6,069	45,662	46,923	43,557
Totals	106,399	82,020	106,894	761,404	692,777	687,957
Lambton	4,626	2,819	2,435	145,220	100,335	111,791
Huron	2,419	1,771	2,701	554,924	400,228	443,963
Bruce	10,161	4,449	4,829	640,730	406,827	522,122
Totals	17,206	9,039	9,965	1,340,874	907,390	1,077,876
Grey	7,444	4,164	5,838	638,380	637,103	605,344
Simcoe	25,136	22,396	25,157	488,573	415,581	419,861
Totals	32,580	26,560	30,995	1,126,953	1,052,684	1,025,205
Middlesex	8,085	4,729	5,131	293,187	232,385	261,631
Oxford	12,665	13,552	11,114	195,552	147,971	200,273
Brant	14,437	9,342	9,388	147,944	128,419	112,685
Perth	625	448	1,651	346,964	235,319	319,647
Wellington	5,573	7,710	8,622	551,899	434,428	519,893
Waterloo	5,312	2,490	5,415	250,835	166,410	200,891
Dufferin	2,728	1,758	7,532	194,428	157,477	153,268
Totals	49,425	40,029	48,853	1,980,809	1,502,409	1,768,288
Lincoln	4,088	1,196	3,980	72,442	50,053	54,380
Wentworth	7.628	8,693	9,863	166,854	124,077	135,173
Halton	6,147	4,225	5,180	163,088	114,709	139,269
Peel	5,157	7,291	15,510	256,680	155,434	179,741
York	10,904	14,174	16,757	465,507	360,949	389,069
Ontario	11,748	15,187	28,008	286,751	288,647	332,982
Durham	29,039	33,296	43,872	224,186	187,049	254,439
Northumberland	82,106	69,782	89,872	248,373	216,529	211,461
Prince Edward	46,696	79,713	72,121	249,680	189,897	140,948
Totals	203,513	233,557	285,163	2,133,561	1,687,344	1,837,462
Lennox and Addington	26,181	31,535	43,288	110,005	97,598	98,856
Frontenac	25,555	27,776	36,441	109,248	75,596	119,187
Leeds and Grenville	30,422	16,218	64,261	57,303	56,574	73,022
Dundas	5,481	9,131	18,001	18,873	10,455	22,478
Stormont	3,062	2,138	5,674	21,322	10,577	31,757
Glengarry	1,589	....	682	43,689	26,201	63,452
Prescott	413	1,705	2,744	67,494	29,740	86,293
Russell	5,212	120	2,860	46,275	15,616	45,376
Carleton	43,477	41,285	64,078	137,635	152,321	168,191
Renfrew	82,241	64,621	76,727	284,813	314,691	261,244
Lanark	26,867	22,212	51,564	138,885	144,823	148,467
Totals	250,500	216,741	366,320	1,035,542	934,192	1,118,323
Victoria	16,680	12,245	12,412	229,138	196,941	200,975
Peterborough	45,446	14,251	31,097	215,126	177,568	176,717
Haliburton	3,522	1,342	2,628	24,025	16,621	18,565
Hastings	89,754	84,152	126,151	269,705	234,319	200,493
Totals	155,402	111,990	172,288	737,994	625,449	596,750
Muskoka	3,249	2,258	4,323	50,054	34,200	35,534
Parry Sound	1,956	1,637	4,103	30,143	15,288	18,813
Nipissing	821	....	91	8,730	....	970
Algoma	2,832	4,894	2,143	73,692	72,912	60,004
Totals	8,858	8,789	10,660	162,619	122,400	115,321
The Province	823,883	728,725	1,031,138	9,279,756	7,524,645	8,227,182

VALUES—CORN, BUCKWHEAT AND BEANS.

TABLE VIII. Showing by County Municipalities and groups of Counties the value at market prices of the total crop of Corn, Buckwheat and Beans in Ontario in the years 1889 and 1890, with the yearly average for the six years 1885-90.

Counties.	Corn.			Buckwheat.			Beans.		
	1890.	1889.	1885-90.	1890.	1889.	1885-90.	1890.	1889.	1885-90.
	$	$	$	$	$	$	$	$	$
Essex	873,362	286,804	657,101	7,350	3,775	6,955	24,278	8,874	12,921
Kent	613,583	285,022	489,396	12,700	4,433	7,740	632,382	242,435	304,439
Elgin	247,688	166,447	275,361	18,873	10,475	11,716	64,123	23,906	27,957
Norfolk	197,867	171,853	231,601	48,780	28,302	37,588	7,869	7,412	6,593
Haldimand	27,934	32,434	33,993	4,186	6,751	5,648	6,350	3,636	2,908
Welland	81,850	67,378	102,683	17,061	11,084	14,219	17,810	8,139	9,075
Totals	2,042,284	1,009,938	1,790,135	108,950	64,820	83,866	752,812	294,402	363,893
Lambton	172,663	66,288	126,071	7,352	2,323	3,811	7,457	5,166	6,474
Huron	45,362	24,476	32 072	3,922	967	2,241	3,566	3,370	3,260
Bruce	24,026	13,610	13,217	5,177	1,848	3,073	3,469	2,439	2,451
Totals	242,051	104,374	171,360	16,451	5,138	9,125	14,492	10,975	12,185
Grey	30,561	9,468	11,254	4,848	1,366	2,746	9,021	2,002	2,914
Simcoe	24,968	15,503	15,027	7,232	1,628	3,057	1,804	3,446	2,210
Totals	55,529	24,971	26,281	12,080	2,994	5,803	10,825	5,448	5,124
Middlesex	247,363	131,931	198,641	3,266	3,448	3,981	7,862	6,044	5,331
Oxford	193,239	94,634	147,465	6,820	3,332	4,457	3,986	5,676	4,477
Brant	108,890	82,517	89,270	6,590	3,657	5,062	6,429	868	2,890
Perth	28,031	8,630	15,130	925	508	861	321	1,824	1,101
Wellington	28,383	10.736	12,166	6,257	1,195	1,823	1,002	1,242	907
Waterloo	28,844	16,690	17,986	1,238	218	767	1,568	661	855
Dufferin	3,446	1,554	1,618	679	469	944	719	532	515
Totals	638,196	346,692	482,276	25,775	12,827	17,895	21,887	16,847	16,076
Lincoln	78,479	76,990	109,272	8,367	3,830	5,354	6,733	3,852	3,675
Wentworth	101,777	69,653	82,216	11,389	3,540	6,761	11,471	2,680	3,797
Halton	39,429	25,797	22,084	559	1,373	965	383	1,064	836
Peel	20,514	21,776	11,868	1,591	2,649	1,850	540	1,552	912
York	49,904	27,367	29,154	1,096	1,549	1,543	2,538	3,274	2,801
Ontario	51,988	40,143	42,982	11,339	5,617	5,486	5,424	1,996	3,004
Durham	34,549	35,212	25,328	37,278	15,841	17,160	9,219	4,964	5,710
Northumberland	80,861	66,837	59,198	99,673	55,666	60,903	12,366	10,675	9,719
Prince Edward	136,785	85,208	81,887	89,246	46,183	73,089	8,816	11,289	8,919
Totals	594,286	448,983	463,989	260,538	136,248	173,111	57,490	41,346	39,373
Lenuox and Add.	45,806	48,570	35,288	62,681	26,848	31,510	6,542	2,882	3,199
Frontenac	41,249	27,065	27,138	23,828	13,787	15,986	3,251	6,246	6,490
Leeds & Grenville	191,219	129,420	113,824	75,176	49,083	50,115	14,884	7,083	8,646
Dundas	40,115	26,938	31,992	31,946	15,288	19,612	7,324	13,992	7,230
Stormont	38,636	18,081	21,683	28,549	14,671	22,014	5,360	7,640	4,265
Glengarry	46,076	13,569	15,161	15,219	10,629	9,104	5,962	1,882	2,448
Prescott	29,083	20,240	21,702	14,547	10,940	12,659	8,209	12,946	9,544
Russell	13,372	5,047	5,885	15,114	7,470	8,907	4,557	2,335	3,293
Carleton	51,598	26,571	24,640	27,451	43,247	32,359	17,733	11,261	10,025
Renfrew	10,843	5,785	6,403	13,817	5,972	10,844	15,928	15,670	11,520
Lanark	38,659	22,395	19,744	46,726	37,824	41,239	6,894	7,584	5,114
Totals	546,656	343,381	323,460	355,054	235,759	254,349	96,644	89,521	71,774
Victoria	13,286	16,259	11,631	18,517	5,589	5,305	3,653	1,546	1,674
Peterborough	12,138	4,930	5,883	21,851	4,752	8,408	7,248	874	2,305
Haliburton	1,793	1,233	1,342	3,772	1,435	1,659	668	697	542
Hastings	122,681	89,887	81.461	50,035	29,632	38,124	9,622	6,910	6,675
Totals	149,898	112,309	100,317	94,175	41,408	53,496	21,191	10,027	11,196
Muskoka	2,612	2,590	2,217	5,396	2,656	3,173	1,070	1,495	953
Parry Sound	683	315	458	2,452	154	923	1,054	215	320
Nipissing	409	....	68	939	....	157	293	....	49
Algoma	806	1,430	930	1,290	664	687	565	912	422
Totals	4,510	4,335	3,673	10,077	3,474	4,940	2,982	2,622	1,744
The Province	4,273,410	2,395,283	3,361,491	883,100	502,668	602,585	978,323	471,188	521,365

VALUES—HAY AND CLOVER AND POTATOES.

TABLE IX. Showing by County Municipalities and groups of Counties the value at market prices of the total crop of Hay and Clover and Potatoes in Ontario in the years 1889 and 1890, with the yearly average for the six years 1885-90.

Counties.	Hay and Clover.			Potatoes.		
	1890.	1889.	1885-90.	1890.	1889.	1885-90.
	$	$	$	$	$	$
Essex	553,042	767,592	672,101	91,453	59,564	99,736
Kent	840,919	1,022,970	894,035	128,804	94,203	130,716
Elgin	827,969	1,059,636	842,958	98,697	69,146	102,706
Norfolk	578,203	675,995	543,197	88,911	66,167	92,588
Haldimand	649,269	706,694	662,462	41,167	34,664	58,429
Welland	729,468	841,444	670,436	63,406	57,078	74,758
Totals	4,178,870	5,074,331	4,285,189	512,438	380,822	558,933
Lambton	838,844	976,104	875,227	112,591	62,010	108,843
Huron	1,664,889	1,650,712	1,538,060	238,455	214,293	248,555
Bruce	1,350,944	1,363,138	1,269,556	234,387	200,838	234,476
Totals	3,854,677	3,989,954	3,682,843	585,433	477,141	591,874
Grey	1,905,178	1,814,274	1,610,666	482,444	296,011	390,927
Simcoe	1,080.858	1,272,919	1,072,143	435,437	339,903	371,983
Totals	2,986,036	3,087,193	2,682,809	917,881	635,914	762,910
Middlesex	1,507,590	1,642,908	1,474,401	255,793	118,118	211,557
Oxford	1,146,962	1,061,872	1,029,870	125,969	95,029	122,197
Brant	596,815	522,892	449,025	104,928	73,369	93,701
Perth	1,266,332	1,106,213	1,139,300	194,773	83,882	163,366
Wellington	1,438,950	1,308,398	1,352,743	365,749	279,270	297,860
Waterloo	680,774	624,119	682,902	155,619	99,377	138,609
Dufferin	497,630	539,529	462,499	239,237	141,861	183,591
Totals	7,135,053	6,805,931	6,590,740	1,442,068	890,906	1.210,881
Lincoln	616,872	650,396	609,067	62,068	45,643	71,029
Wentworth	754,884	747,282	653,035	173,632	107,403	154,962
Halton	424,681	502,962	434,846	65,017	56,234	67,795
Peel	527,761	580,966	531,175	122,314	107 171	117,307
York	1,008,338	1,113,818	1,010,662	384,200	357,283	332,213
Ontario	847,605	857,971	782,326	202,578	229,762	219,219
Durham	711,883	681,794	626,814	138,850	173,807	154,911
Norshumberland	735,645	818,979	727,173	211,288	186,704	183,319
Prince Edward	422,074	525,167	427,844	80,510	68,662	92,115
Totals	6,049,743	6,479,335	5,802,942	1,440,457	1,332,669	1,392,870
Lennox and Addington	760,449	779,468	644,667	117,789	144,138	149,918
Frontenac	874,524	1,017,721	750,923	159,974	117,882	151,118
Leeds and Grenville	1,431,127	1,917,038	1,579,563	333,643	225,907	350,481
Dundas	477,851	657,343	621,910	161,979	75,945	136,828
Stormont	409,568	679,119	573,848	96,729	39,724	95,611
Glengarry	432,027	849,029	684,280	111,567	45,586	111,742
Prescott	508,657	546,764	540,634	158,596	100,857	139,968
Russell	223,610	235,837	253,819	78,137	58,455	64,783
Carleton	667,076	766,833	888,886	358,305	411,279	328,621
Renfrew	672,498	787,362	698,015	220,324	327,645	245,376
Lanark	665,622	931,154	882,730	186,652	213,585	196,708
Totals	7,123,009	9,167,668	8,119,275	1,983,695	1,761,003	1,971,154
Victoria	435,284	501,894	465,769	214,749	246,471	181,786
Peterborough	520,296	497,703	443,524	155,873	197,490	138,290
Haliburton	94,565	104,111	115,970	38,913	39,815	34,482
Hastings	1,027,021	959,298	900,547	229,395	326,630	277,752
Totals	2,127,166	2,063,006	1,925,810	638,930	810,406	632,310
Muskoka	329,694	241,716	297,980	78,360	115,499	84,203
Parry Sound	173,867	131,017	117,550	70.863	62,002	52,743
Nipissing	65,373	...	10,896	26,731	....	4,455
Algoma	208,536	168,413	152,119	82,719	65,404	60,311
Totals	777,470	541,146	578,545	258,673	242,905	201,712
The Province	34,232,024	37,208,564	33,668,153	7,779,575	6,531,766	7,322,644

VALUES—CARROTS AND TURNIPS.

TABLE X. Showing by County Municipalities and groups of Counties the value at market prices of the total crop of Carrots and Turnips in Ontario in the years 1889 and 1890, with the yearly average for the six years 1885-90.

Counties.	Carrots.			Turnips.		
	1890.	1889.	1885-90.	1890.	1889.	1885-90.
	$	$	$	$	$	$
Essex	11,073	3,440	7,378	16,704	4,947	12,690
Kent	23,605	8,641	15,219	37,026	19,689	26,427
Elgin	24,965	14,393	16,032	36,019	25,822	27,590
Norfolk	21,648	13,104	12,974	109,662	99,513	101,105
Haldimand	8,742	8,526	8,034	7,526	15,769	9,200
Welland	4,170	7,609	7,136	13,002	11,895	13,713
Totals	94,203	55,713	66,773	219,939	177,635	190,725
Lambton	27,714	16,507	18,719	23,967	17,282	20,129
Huron	50,646	42,981	48,698	766,013	484,689	634,897
Bruce	38,549	18,590	25,760	626,072	405,149	559,433
Totals	116,909	78,078	93,177	1,416,052	907,120	1,214,459
Grey	66,480	37,969	51,094	1,035,500	668,679	870,790
Simcoe	64,970	56,770	56,037	418,166	365,580	345,431
Totals	131,450	94,739	107,131	1,453,666	1,034,259	1,216,221
Middlesex	72,626	33,586	44,926	159,986	101,779	146,215
Oxford	39,921	41,186	36,298	636,417	369,339	554,859
Brant	27,906	16,757	23,015	384,525	198,509	310,878
Perth	61,310	22,866	45,169	512,346	219,602	411,719
Wellington	43,810	17,810	26,405	1,363,850	994,903	1,287,442
Waterloo	45,951	36,022	36,031	496,814	284,659	463,450
Dufferin	10,747	13,118	12,327	279,683	211,582	214,521
Totals	302,271	181,345	224,171	3,833,621	2,380,373	3,389,084
Lincoln	11,056	9,986	10,957	24,146	20,253	20,538
Wentworth	29,512	14,469	22,772	395,704	223,013	310,408
Halton	12,172	17,035	14,252	226,935	111,209	188,094
Peel	25,715	25,908	24,885	157,677	116,140	118,447
York	104,099	62,072	75,956	478,679	301,141	345,353
Ontario	66,046	48,366	55,439	1,606,761	1,154,318	1,242,127
Durham	58,684	66,414	52,767	556,335	492,439	532,568
Northumberland	32,568	38,615	27,271	105,965	359,609	336,469
Prince Edward	5,856	5,160	4,434	9,558	3,967	7,251
Totals	345,708	288,025	288,733	3,861,760	2,782,089	3,101,255
Lennox and Addington	6,746	5,670	5,230	6,562	4,976	7,491
Frontenac	7,581	15,980	13,392	17,234	27,448	30,374
Leeds and Grenville	28,611	16,424	16,171	36,118	24,957	22,908
Dundas	10,836	3,490	5,251	5,144	4,674	3,959
Stormont	2,835	6,634	2,730	13,716	3,648	6,156
Glengarry	2,835	3,634	3,060	5,914	1,180	4,486
Prescott	3,698	3,481	4,115	5,206	7,883	10,745
Russell	23,134	15,124	14,294	60,582	38,961	34,757
Carleton	95,502	47,507	50,577	245,146	142,449	138,463
Renfrew	10,144	7,494	7,377	61,890	56,528	46,955
Lanark	21,674	10,000	11,958	46,229	52,531	42,145
Totals	213,596	135,438	134,155	503,741	365,235	348,439
Victoria	28,856	41,564	34,427	303,385	333,518	324,205
Peterborough	56,065	30,721	30,800	168,857	150,605	113,675
Haliburton	2,677	1,262	2,024	21,613	25,025	22,368
Hastings	21,427	16,897	16,639	67,976	97,993	68,891
Totals	109,025	90,144	83,890	561,831	607,141	529,139
Muskoka	7,875	8,966	6,200	76,620	110,078	81,515
Parry Sound	3,142	1,583	2,175	53,611	48,292	46,129
Nipissing	630	....	105	8,602	....	1,433
Algoma	1,512	2,594	2,260	52,941	28,625	39,084
Totals	13,159	13,143	10,740	191,774	186,995	168,161
The Province	1,326,321	936,925	1,008,770	12,042,384	8,440,847	10,157,483

VALUES—WHEAT TO PEASE AND CORN TO TURNIPS.

TABLE XI. Showing by County Municipalities and Groups of Counties the aggregate value of Wheat, Barley, Oats, Rye and Pease, and of Corn, Buckwheat, Beans, Hay, Potatoes, Carrots and Turnips in Ontario in 1889 and 1890, with the yearly average of the first group for nine years 1882-90, and of the second group for six years 1885-90.

Counties.	Wheat, Barley, Oats, Rye and Pease.			Corn, Buckwheat, Beans, Hay and Clover, Potatoes, Carrots and Turnips.		
	1890.	1889.	1882-90.	1890.	1889.	1885-90.
	$	$	$	$	$	$
Essex	1,011,342	854,789	1,078,820	1,577,262	1,134,996	1,468,882
Kent	1,694,724	1,458,893	1,769,905	2,289,019	1,677,393	1,867,972
Elgin	1,430,102	1,118,912	1,441,794	1,318,334	1,369,825	1,304,320
Norfolk	1,199,904	940,435	1,168,229	1,052,940	1,062,346	1,025,646
Haldimand	977,459	955,667	1,107,643	745,174	808,474	780,674
Welland	568,669	540,113	647,366	926,767	1,004,627	892,020
Totals	6,882,200	5,868,809	7,213,757	7,909,496	7,057,661	7,339,514
Lambton	1,495,491	1,292,420	1,507,012	1,190,588	1,145,680	1,159,274
Huron	3,253,826	2,420,543	3,224,285	2,772,853	2,421,488	2,507,783
Bruce	2,638,717	1,723,978	2,482,169	2,282,624	2,005,612	2,107,966
Totals	7,388,034	5,436,941	7,213,466	6,246,065	5,572,780	5,775,023
Grey	2,813,494	2,422,959	2,915,663	3,534,032	2,829,769	2,940,391
Simcoe	3,084,120	3,083,224	3,133,939	2,033,435	2,055,749	1,865,888
Totals	5,897,614	5,506,183	6,049,602	5,567,467	4,885,518	4,806,279
Middlesex	2,920,929	2,146,396	2,885,707	2,254.486	2,037,814	2,085,052
Oxford	2,008,807	1,626,986	2,030,374	2,153,314	1,671,068	1,899,623
Brant	1,140,580	961,498	1,129,824	1,236,083	898,569	973,841
Perth	2,364,679	1,794,955	2,362,342	2,064,038	1,443,525	1,776,646
Wellington	2,797,704	2,434,978	2,736,332	3,248,001	2,613,554	2,979,346
Waterloo	1,807,430	1,477,561	1,750,277	1,410,808	1,061,746	1,340,600
Dufferin	1,216,714	929,666	1,128,308	1,032,141	908,645	876,015
Totals	14,256,843	11,372,040	14,023,164	13,398,871	10,634,921	11,931,123
Lincoln	631,367	573,005	693,256	807,721	810,950	829,892
Wentworth	1,115,592	948,964	1,240,101	1,478,369	1,168,040	1,233,951
Halton	927,940	1,025,457	1,009,326	769,176	715,674	728,872
Peel	1,736,692	1,693,878	1,801,625	856,112	856,162	806,444
York	2,912,201	3,058,619	3,317,664	2,028,854	1,866,504	1,797,682
Ontario	1,915,118	2,377,558	2,522,887	2,791,741	2,338,173	2,350,583
Durham	1,399,008	1,719,825	2,003,671	1,546,798	1,470,471	1,415,258
Northumberland	1,511,511	1,504,371	1,723,039	1,578,366	1,537,085	1,404,052
Prince Edward	915,643	931,672	917,223	752,845	745,636	695,539
Totals	13,065,072	13,833,349	15,228,792	12,609,982	11,508,695	11,262,273
Lennox and Addington	700,460	848,263	950,154	1,006,575	1,012,552	877,303
Frontenac	642,834	661,060	806,557	1,127,641	1,226,129	995,421
Leeds and Grenville	1,001,500	1,032,341	1,283,799	2,110,778	2,369,912	2,141,708
Dundas	444,304	429,621	612,739	735,195	797,670	826,782
Stormont	371,398	305,098	452,390	595,393	769,517	726,307
Glengarry	441,823	410,577	553,351	619,600	925,509	830,281
Prescott	560,392	385,998	535,566	727,996	703,111	739,367
Russell	392,512	254,132	342,203	418,506	363,229	385,738
Carleton	1,303,895	1,286,171	1,451,978	1,462,811	1,449,147	1,473,571
Renfrew	1,166,175	1,418,027	1,190,119	1,005,444	1,206,456	1,026,490
Lanark	812,864	798,787	890,077	1,012,456	1,275,073	1,199,638
Totals	7,838,157	7,830,075	9,068,933	10,822,395	12,098,305	11,222,606
Victoria	1,509,823	1,555,933	1,669,477	1,067,730	1,146,841	1,024,797
Peterborough	1,133 951	1,116,986	1,202,339	942,328	887,075	742,885
Haliburton	117,748	108,020	92,467	164,001	173,578	178,387
Hastings	1,384,028	1,573,644	1,617,479	1,528,157	1,527,247	1,390,089
Totals	4,145,550	4,354,583	4,581,762	3,702,216	3,734,741	3,336,158
Muskoka	189,994	157,280	157,805	501,627	483,000	476,241
Parry Sound	134,782	78,385	105,085	305,672	243,578	220,298
Nipissing	35,533	....	3,948	102,977	....	17,163
Algoma	244,159	244,686	244,430	348,369	268,042	255,813
Totals	604,468	480,351	511,268	1,258,645	994,620	969,515
The Province	60,077,938	54,682,331	63,890,744	61,515,137	56,487,241	56,642,491

VALUES—ALL FIELD CROPS AND WOOL.

TABLE XII. Showing by County Municipalities and Groups of Counties the aggregate value of all Field Crops in Ontario in the years 1889 and 1890, with the yearly average (determined by combining averages in preceding table); also the value, at market price, of the total clip of Wool in 1889 and 1890, with the yearly average for the six years 1885-90.

Counties.	All field crops.			Wool.		
	1890.	1889.	Yearly average.	1890.	1889.	1885-90.
	$	$	$	$	$	$
Essex	2,588,604	1,989,785	2,547,702	17,199	15,883	16,575
Kent	3,983,743	3,136,286	3,637,877	23,271	20,512	21,347
Elgin	2,748,436	2,488,737	2,746,114	27,359	22,508	22,522
Norfolk	2,252,844	2,002,781	2,193,875	14,914	13,803	15,275
Haldimand	1,722,633	1,764,141	1,888,317	18,295	15,482	18,792
Welland	1,495,436	1,544,740	1,539,386	12,403	12,247	13,809
Totals	14,791,696	12,926,470	14,553,271	113,441	100,435	108,320
Lambton	2,686,079	2,438,100	2,666,286	29,805	24,437	25,347
Huron	6,026,679	4,842,031	5,732,068	47,785	46,827	49,215
Bruce	4,921,341	3,729,590	4,590,135	55,733	56,124	53,162
Totals	13,634,099	11,009,721	12,988,489	133,323	127,388	127,724
Grey	6,347,526	5,252,728	5,856,054	73,263	74,551	73,957
Simcoe	5,117,555	5,138,973	4,999,827	43,012	47,187	48,841
Totals	11,465,081	10,391,701	10,855,881	116,275	121,738	122,798
Middlesex	5,175,415	4,184,210	4,970,759	41,048	35,577	37,292
Oxford	4,162,121	3,298,054	3,929,997	13,244	16,886	17,719
Brant	2,376,663	1,860,067	2,103,665	11,911	11,715	13,349
Perth	4,428,717	3,238,480	4,138,988	32,223	30,899	32,507
Wellington	6,045,705	5,048,532	5,715,678	46,319	48,799	49,787
Waterloo	3,218,238	2,539,307	3,090,877	20,969	19,882	21,806
Dufferin	2,248,855	1,838,311	2,004,323	17,419	18,928	19,068
Totals	27,655,714	22,006,961	25,954,287	183,133	182,686	191,528
Lincoln	1,439,088	1,383,955	1,523,148	8,231	8,714	9,529
Wentworth	2,593,961	2,117,004	2,474,052	14,185	13,745	15,162
Halton	1,697,116	1,741,131	1,738,198	11,441	11,806	12,912
Peel	2,592,804	2,550,040	2,608,069	12,174	17,492	18,134
York	4,941,055	4,925,123	5,115,346	24,582	25,376	29,752
Ontario	4,706,859	4,715,731	4,873,470	25,958	29,890	29,908
Durham	2,945,806	3,190,296	3,418,929	18,670	21,257	22,014
Northumberland	3,089,877	3,041,456	3,127,091	17,672	20,430	22,029
Prince Edward	1,668,488	1,677,308	1,612,762	6,805	7,748	8,458
Totals	25,675,054	25,342,044	26,491,065	139,718	156,458	167,898
Lennox and Addington	1,707,035	1,860,815	1,827,457	11,322	10,639	14,178
Frontenac	1,770,475	1,887,189	1,801,978	16,137	13,563	16,767
Leeds and Grenville	3,112,278	3,402,253	3,425,507	26,228	26,857	31,191
Dundas	1,179,499	1,227,291	1,439,521	6,566	8,136	9,302
Stormont	966,791	1,074,615	1,178,697	7,451	9,156	9,505
Glengarry	1,061,423	1,336,086	1,383,632	10,678	11,699	12,870
Prescott	1,288,388	1,089,109	1,274,933	9,236	10,928	10,422
Russell	811,018	617,361	727,941	7,236	5,590	7,049
Carleton	2,766,706	2,735,318	2,925,549	21,472	26,746	26,539
Renfrew	2,171,619	2,624,483	2,216,609	33,870	35,757	33,433
Lanark	1,825,320	2,073,860	2,089,715	29,091	26,060	30,001
Totals	18,660,552	19,928,380	20,291,539	179,287	185,131	201,257
Victoria	2,577,553	2,702.774	2,694,274	20,551	20,241	22,684
Peterborough	2,076,279	2,004,061	1,945,224	13,323	15,312	16,034
Haliburton	281,749	281,598	270,854	3,124	3,285	3,154
Hastings	2,912,185	3,100,891	3,007,568	16,697	21,487	22,950
Totals	7,847,766	8,089,324	7,917,920	53,695	60,325	64,822
Muskoka	691,621	610,280	634,046	5,961	7,079	6,518
Parry Sound	440,454	321,963	325,383	4,612	3,160	2,927
Nipissing	138,510	....	21,111	446	....	74
Algoma	592,528	512,728	500,243	7,923	5,501	4,953
Totals	1,863,113	1,474,971	1,480,783	18,942	15,740	14,472
The Province	121,593,075	111,169,572	120,533,235	937,814	949,901	998,819

VALUE PER ACRE—FALL WHEAT, SPRING WHEAT AND BARLEY.

TABLE XIII. Showing by County Municipalities and groups of Counties the market value of crop per acre of Wheat and Barley in Ontario, in 1889 and 1890, with the yearly average for nine years 1882-90.

Counties.	Fall wheat.			Spring wheat.			Barley.		
	1890.	1889.	1882-90.	1890.	1889.	1882-90.	1890.	1889.	'82-90
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Essex	15 54	13 88	17 47	12 14	11 63	13 00	11 30	10 60	13 92
Kent	18 84	12 91	17 33	13 06	15 42	13 37	12 05	12 26	14 79
Elgin	20 16	14 41	17 43	14 88	13 30	12 67	11 90	11 57	14 73
Norfolk	19 03	12 91	15 91	12 51	12 07	12 14	10 74	9 64	14 13
Haldimand	14 13	12 73	14 15	10 13	10 75	11 63	7 88	9 72	12 36
Welland	16 01	13 17	14 14	10 77	9 16	11 72	8 23	9 72	12 75
Group	17 68	13 32	16 37	12 04	12 79	12 50	10 31	10 60	13 52
Lambton	17 14	14 76	16 87	13 79	11 72	12 39	10 44	11 18	14 21
Huron	20 72	11 93	17 42	14 88	11 54	11 73	12 70	11 53	15 05
Bruce	20 44	11 40	17 25	13 88	10 66	12 18	13 10	9 81	14 28
Group	19 64	12 59	17 24	14 17	10 98	12 01	12 21	10 92	14 61
Grey	16 77	11 58	17 76	12 14	10 92	12 70	12 65	9 68	13 63
Simcoe	17 14	15 82	18 59	12 05	12 86	13 46	11 85	11 92	14 01
Group	17 04	14 50	18 32	12 10	12 03	13 05	12 12	11 18	13 85
Middlesex	21 38	13 08	17 69	15 79	13 39	12 50	12 30	10 82	14 63
Oxford	22 23	15 03	17 82	14 97	14 36	13 69	13 75	12 32	16 53
Brant	20 63	14 14	16 46	15 43	13 83	12 09	12 30	12 45	14 80
Perth	20 25	11 85	17 40	15 89	15 15	12 93	13 96	13 42	16 28
Wellington	17 99	13 44	17 74	16 07	13 39	13 14	13 75	13 42	15 44
Waterloo	20 16	14 94	18 28	15 25	14 10	13 02	14 91	14 21	16 75
Dufferin	17 14	12 46	17 19	13 88	10 22	12 85	12 55	10 65	13 86
Group	20 75	13 60	17 60	15 11	11 67	12 99	13 44	12 72	15 53
Lincoln	16 49	15 82	15 82	10 59	11 72	12 44	9 59	10 08	13 60
Wentworth	16 11	13 70	16 13	13 06	11 36	12 79	10 89	11 13	15 11
Halton	15 07	19 62	16 96	12 60	14 80	13 33	12 05	13 29	15 39
Peel	16 86	16 80	18 62	13 97	14 01	14 97	11 80	12 80	15 06
York	20 06	18 92	19 63	11 87	13 74	15 02	10 99	13 73	15 79
Ontario	19 97	15 65	20 21	9 59	14 45	15 03	10 54	13 02	15 49
Durham	20 63	13 44	18 53	9 68	13 48	14 59	8 63	12 32	14 51
Northumberland	19 22	11 67	18 32	9 86	9 87	12 39	8 89	10 03	12 28
Prince Edward	21 67	19 89	16 40	11 78	9 34	12 05	9 79	10 69	11 30
Group	17 66	16 24	17 82	10 85	13 23	14 26	10 30	12 18	14 23
Lennox and Addington	17 90	16 53	16 03	9 40	11 63	12 81	8 68	10 87	12 15
Frontenac	14 51	14 23	17 00	9 59	9 51	13 09	9 49	8 84	12 70
Leeds and Grenville	14 32	15 91	16 83	8 86	10 13	13 73	9 14	10 16	13 71
Dundas	14 13	18 12	17 55	12 14	11 89	16 22	10 19	10 47	16 45
Stormont	11 30	15 82	16 89	12 60	11 01	15 69	11 30	11 22	15 15
Glengarry	11 78	15 91	15 53	10 50	12 07	14 13	10 24	9 90	12 50
Prescott	11 30	....	11 79	12 33	9 07	13 76	11 04	11 31	14 14
Russell	15 07	14 14	16 86	12 42	12 25	14 70	11 85	12 58	13 15
Carleton	18 09	15 82	14 64	9 77	16 03	14 90	12 45	12 67	15 67
Renfrew	17 90	20 86	17 47	11 23	17 27	14 65	9 49	13 77	12 98
Lanark	11 87	16 97	17 51	8 22	9 51	12 90	10 64	12 10	14 02
Group	15 14	16 33	16 70	10 23	12 90	14 18	9 90	10 67	13 25
Victoria	14 41	12 11	17 66	11 78	12 69	13 50	11 04	11 88	13 75
Peterborough	14 98	10 52	17 54	10 59	10 92	11 93	10 09	11 13	13 28
Haliburton	12 81	12 64	14 39	10 04	13 92	11 49	10 19	11 22	12 97
Hastings	17 90	17 95	17 67	10 68	10 66	13 54	8 94	10 74	12 59
Group	16 37	13 80	17 60	11 14	11 70	12 93	9 98	11 26	13 13
Muskoka	14 13	15 47	15 57	12 51	11 98	13 38	10 04	9 15	11 77
Parry Sound	11 78	13 26	14 63	10 50	11 54	14 43	10 94	9 33	12 32
Nipissing	13 00	....	13 00	13 06	......	13 00	11 19	....	11 19
Algoma	18 27	13 26	18 56	14 24	16 74	17 88	10 69	11 00	14 17
Group	16 88	13 61	17 85	13 35	15 63	16 62	10 66	9 91	12 74
The Province	18 66	13 98	17 33	11 66	12 59	13 59	11 17	11 76	14 18

VALUE PER ACRE—OATS, RYE AND PEASE.

TABLE XIV. Showing by County Municipalities and groups of Counties the market value of crop per acre of Oats, Rye and Pease in Ontario in 1889 and 1890, with the yearly average for nine years 1882-90.

Counties.	Oats.			Rye.			Pease.		
	1890.	1889.	1882-90.	1890.	1889.	1882-90.	1890.	1889.	'82-90
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Essex	10 56	10 43	13 53	8 96	9 54	11 46	10 67	9 02	11 40
Kent	11 80	11 80	14 15	11 44	11 20	11 92	9 11	9 25	11 39
Elgin	10 52	10 07	13 43	8 96	9 82	10 34	7 90	8 52	10 80
Norfolk	8 80	7 63	11 38	6 75	4 58	7 92	9 65	11 14	11 60
Haldimand	8 14	8 72	11 23	7 38	4 99	9 92	9 53	9 19	11 18
Welland	7 23	8 97	11 03	7 91	8 45	9 82	7 54	10 47	10 23
Group	9 80	9 76	12 73	7 60	6 24	8 90	9 04	9 64	11 19
Lambton	10 15	9 88	12 73	10 01	9 04	9 78	9 17	8 36	11 09
Huron	12 82	10 16	13 10	7 91	7 64	10 00	12 18	11 03	13 44
Bruce	12 33	7 84	11 64	10 54	10 18	10 50	14 71	10 08	13 87
Group	11 95	9 29	12 52	9 93	9 21	10 18	12 78	10 24	13 35
Grey	12 21	9 09	11 38	7 22	10 33	10 17	13 15	12 37	13 17
Simcoe	12 45	11 22	12 10	8 27	8 96	10 60	13 02	12 03	13 10
Group	12 31	9 96	11 69	8 01	9 15	10 52	13 09	12 23	13 14
Middlesex	12 33	10 68	13 58	9 06	8 55	9 89	9 83	8 08	11 51
Oxford	12 21	11 13	13 67	8 43	8 81	8 98	9 47	7 85	12 64
Brant	11 67	10 68	13 01	8 91	5 85	8 57	12 00	13 20	12 28
Perth	14 63	12 11	14 62	7 91	10 18	8 69	11 82	8 36	13 58
Wellington	13 40	12 17	13 15	8 96	8 25	10 49	12 72	10 97	13 76
Waterloo	12 21	11 41	13 43	9 22	5 50	10 14	12 54	10 25	13 59
Dufferin	10 85	10 28	12 11	7 64	5 34	10 59	12 66	11 81	12 81
Group	12 75	11 36	13 50	8 75	7 35	9 56	11 59	9 71	13 02
Lincoln	8 51	9 33	11 83	6 75	8 60	9 19	9 41	9 52	10 95
Wentworth	10 60	8 94	13 00	7 91	7 33	10 06	11 88	9 41	12 36
Halton	11 47	11 62	12 92	7 01	10 18	9 81	11 88	11 14	13 10
Peel	12 25	12 02	13 33	8 80	7 64	12 14	12 54	9 75	12 61
York	13 07	12 32	14 31	10 01	10 69	10 03	12 90	11 20	13 55
Ontario	12 41	12 57	13 62	7 59	8 55	10 58	10 25	10 25	12 50
Durham	10 56	10 77	12 63	7 43	8 50	9 04	10 13	9 36	11 84
Northumberland	10 36	9 24	10 55	6 64	6 46	7 87	12 30	11 36	10 49
Prince Edward	10 73	9 00	9 90	7 38	7 94	8 10	13 21	10 19	10 45
Group	11 57	11 14	12 91	7 20	7 65	8 71	11 77	10 37	12 15
Lennox and Addington	9 17	9 15	10 03	7 59	7 69	8 76	11 16	11 08	11 20
Frontenac	9 66	8 51	10 14	7 54	8 60	9 87	10 61	8 36	10 96
Leeds and Grenville	9 45	8 91	11 20	7 33	9 11	10 71	10 43	8 86	11 64
Dundas	10 40	8 78	12 56	11 28	10 18	13 62	14 95	6 85	13 44
Stormont	11 51	8 78	12 35	9 22	8 91	12 47	13 02	5 01	12 62
Glengarry	9 41	8 39	11 31	7 91	....	10 03	10 97	6 68	11 17
Prescott	10 48	8 27	10 96	7 64	9 32	10 85	10 55	6 91	10 03
Russell	12 01	8 94	11 40	11 07	10 00	12 23	11 46	8 36	12 14
Carleton	11 71	9 30	12 42	9 54	10 84	10 76	13 75	12 64	13 18
Renfrew	11 06	11 96	11 25	9 01	12 17	11 33	13 39	15 21	12 66
Lanark	11 01	8 63	10 99	8 01	8 86	11 38	12 24	12 37	13 06
Group	10 52	9 18	11 41	8 47	9 82	10 70	12 10	11 33	12 03
Victoria	12 41	10 74	11 88	9 17	9 87	10 07	13 39	12 64	12 55
Peterborough	11 38	10 19	11 14	7 43	6 21	8 98	13 33	12 03	11 71
Haliburton	11 10	9 70	9 75	8 59	9 52	9 88	11 46	11 03	11 64
Hastings	10 64	10 25	10 45	8 54	8 09	9 19	13 02	11 59	10 83
Group	11 46	10 37	11 08	8 24	7 96	9 22	13 16	12 01	11 65
Muskoka	10 93	9 15	10 37	8 85	7 79	11 20	13 33	11 75	12 68
Parry Sound	11 64	8 30	10 82	12 70	11 61	12 74	12 00	10 14	12 95
Nipissing	12 08	....	12 08	10 01	....	10 01	12 54	....	12 54
Algoma	11 30	10 89	12 85	9 22	9 67	9 79	14 05	14 09	15 62
Group	11 02	9 40	11 12	9 73	9 38	11 39	13 32	12 76	14 11
The Province	11 52	10 20	12 36	7 99	8 09	9 58	11 88	10 63	12 47

VALUES PER ACRE—CORN, BUCKWHEAT, BEANS AND HAY.

Table XV. Showing by County Municipalities and groups of Counties the market value of crop per acre of Corn, Buckwheat, Beans and Hay and Clover in Ontario in 1889 and 1890, with the yearly average for six years 1885-90.

Counties.	Corn.			Buckwheat.			Beans.			Hay and Clover.		
	1890.	1889.	'85-90.	1890.	1889.	'85-90.	1890.	1889.	'85-90.	1890.	1889.	'85-90.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Essex	22 72	10 28	20 27	7 87	5 73	9 74	27 37	21 54	22 06	13 83	18 76	17 56
Kent	22 23	12 02	18 72	9 33	6 14	8 31	25 31	18 88	20 30	15 74	18 06	16 86
Elgin	18 61	13 31	19 61	9 20	9 48	8 27	24 67	26 86	22 49	15 18	19 76	16 61
Norfolk	15 19	13 34	17 00	9 03	7 47	8 14	20 82	31 68	18 31	13 59	16 57	13 63
Haldimand	14 58	12 56	18 78	9 80	7 74	7 47	19 66	17 48	18 88	13 44	13 97	13 40
Welland	14 55	11 81	17 93	9 20	6 83	8 18	15 42	16 85	15 28	15 26	15 57	13 87
Group	20 44	11 84	19 09	9 06	7 39	8 25	24 83	19 54	20 35	14 58	17 11	15 32
Lambton	18 73	9 56	17 37	6 67	6 64	7 68	15 93	19 64	17 84	14 15	16 57	15 79
Huron	17 87	12 95	20 20	8 60	7 11	7 78	32 13	25 34	26 94	15 11	15 97	15 50
Bruce	13 12	12 95	15 11	6 02	7 90	6 95	23 13	31 68	20 77	13 36	14 37	14 17
Group	17 81	10 57	17 63	6 80	7 14	7 44	19 88	23 20	20 24	14 22	15 52	15 07
Grey	15 25	9 84	13 93	8 04	5 53	7 13	25 70	25 34	20 52	15 11	14 37	13 38
Simcoe	18 61	14 89	16 00	7 87	7 50	7 08	23 13	25 34	21 25	12 96	14 97	13 66
Group	16 60	12 47	15 04	7 94	6 45	7 10	25 23	25 34	20 83	14 23	14 61	13 49
Middlesex	19 12	12 20	18 18	8 69	7 11	7 12	24 42	22 30	20 27	16 06	17 37	16 31
Oxford	17 93	11 06	17 22	7 31	7 23	7 03	21 20	25 34	24 33	17 33	17 07	16 60
Brant	22 05	15 54	18 99	8 34	7 39	7 90	23 90	20 65	17 20	18 21	17 66	14 54
Perth	16 78	9 07	17 02	10 75	8 06	7 55	32 13	30 91	24 47	17 49	15 97	16 60
Wellington	18 30	12 95	16 94	10 75	9 88	9 96	25 70	25 34	19 72	15 90	15 17	15 88
Waterloo	19 31	15 54	17 16	8 60	4 74	7 91	25 70	22 81	21 88	15 58	15 27	16 18
Dufferin	15 25	12 95	14 70	8 60	6 51	8 35	25 70	25 34	22 39	14 55	14 77	13 48
Group	19 00	12 54	17 89	8 62	7 36	7 64	23 87	24 24	20 91	16 45	16 23	15 93
Lincoln	13 15	11 73	17 42	9 89	7 27	8 71	25 70	24 07	22 27	15 90	15 27	14 59
Wentworth	19 52	15 90	19 39	8 56	6 08	8 79	21 20	28 51	22 60	18 05	16 67	14 75
Halton	21 87	15 54	17 31	8 60	6 24	5 92	22 49	25 34	19 44	13 91	15 37	13 26
Peel	18 30	20 98	17 50	10 75	6 95	7 77	22 49	31 68	22 80	14 71	15 27	14 14
York	18 30	15 23	18 42	6 02	7 90	7 53	32 13	24 07	24 57	14 07	15 77	14 03
Ontario	16 26	12 30	15 95	9 16	11 85	9 96	22 23	22 17	22 59	11 15	16 27	14 54
Durham	15 77	16 32	13 77	9 33	8 45	9 13	23 52	17 30	18 85	15 18	16 77	14 59
Northumberland	15 77	13 73	14 04	9 03	8 33	8 59	20 82	21 92	22 60	12 56	15 27	13 31
Prince Edward	18 64	13 93	14 71	10 58	6 91	9 90	23 39	28 51	19 35	12 56	18 26	13 91
Group	17 13	14 10	16 36	9 55	7 74	9 16	22 72	23 75	21 20	14 49	16 01	14 13
Lennox and Addington	16 93	18 26	15 96	11 05	13 19	9 81	27 37	36 49	20 64	11 93	14 37	12 19
Frontenac	16 78	13 23	14 87	11 35	11 02	9 92	23 90	26 35	24 04	13 36	15 57	11 75
Leeds and Grenville	20 25	18 41	18 60	10 62	9 52	9 26	26 34	21 79	22 99	12 00	16 57	13 69
Dundas	17 96	11 91	17 53	13 20	10 15	11 65	32 13	34 46	26 01	11 93	17 17	16 97
Stormont	22 88	15 70	18 07	12 17	10 23	11 36	27 63	28 51	25 24	10 97	18 56	16 88
Glengarry	22 51	16 84	17 88	9 63	8 89	9 18	25 70	28 51	24 98	10 57	19 16	18 01
Prescott	22 94	15 82	17 28	8 26	10 70	8 62	22 49	26 10	22 09	11 69	15 37	15 34
Russell	17 78	11 66	13 47	11 01	12 13	9 63	23 13	24 07	20 57	10 73	13 97	13 84
Carleton	15 40	13 88	14 33	9 63	12 56	8 84	29 56	28 51	22 73	10 26	13 07	14 56
Renfrew	13 73	12 74	13 37	9 93	8 30	9 19	25 44	36 87	26 12	10 57	11 68	10 92
Lanark	19 06	13 60	14 28	9 50	10 03	8 54	24 80	37 00	25 32	11 29	14 87	14 34
Group	19 00	15 85	16 76	10 60	10 64	9 45	26 41	29 85	23 76	11 52	15 39	13 97
Victoria	18 30	17 48	18 55	9 76	11 69	8 21	29 94	25 34	22 93	11 37	13 27	11 97
Peterborough	16 01	11 66	13 40	11 22	10 31	9 09	25 70	19 01	16 58	12 96	13 47	11 47
Haliburton	12 20	18 13	13 69	11 09	8 30	7 72	25 70	31 68	20 07	9 30	9 78	11 27
Hastings	15 49	12 87	14 33	9 59	8 57	9 20	29 43	17 10	21 81	13 59	13 37	12 81
Group	15 70	13 36	14 65	10 02	9 06	9 00	27 99	18 81	20 54	12 62	13 13	12 18
Muskoka	11 16	12 95	11 31	9 85	9 88	10 27	28 91	25 34	23 24	14 71	10 98	13 39
Parry Sound	12 20	9 84	12 38	12 38	11 85	9 92	25 70	21 50	22 86	11 93	12 38	11 58
Nipissing	11 68	.	11 33	11 05	......	11 21	26 60	......	26 60	13 91	.....	13 91
Algoma	12 20	10 36	12 57	8 60	7 90	8 81	25 70	25 34	23 44	13 91	14 27	13 50
Group	11 53	11 72	11 73	10 27	9 49	10 00	26 86	24 97	23 25	13 71	12 19	13 01
The Province	19 09	12 80	17 97	9 80	8 91	9 02	24 80	21 58	20 86	13 90	15 59	14 44

VALUES PER ACRE—POTATOES, CARROTS AND TURNIPS.

Table XVI. Showing by County Municipalities and groups of Counties the market value per acre of Potatoes, Carrots and Turnips in Ontario in the years 1889 and 1890, with the yearly average for six years 1885-90

Counties.	Potatoes.			Carrots.			Turnips.		
	1890.	1889.	1885-90.	1890.	1889.	1885-90.	1890.	1889.	1885-90.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Essex	35 17	24 12	36 79	106 47	28 67	70 94	96 00	25 76	66 44
Kent	42 75	36 40	42 89	101 75	52 69	87 97	91 65	69 08	84 70
Elgin	37 30	31 08	39 12	112 46	82 72	96 00	89 60	65 21	82 36
Norfolk	31 67	24 07	31 02	78 44	68 25	77 23	83 97	63 38	85 39
Haldimand	31 19	26 48	42 07	100 49	66 61	80 34	89 60	59 28	66 19
Welland	28 13	29 21	34 07	68 36	73 16	85 98	62 21	63 61	77 47
Group	35 00	28 64	37 38	95 93	63 17	83 99	85 28	61 34	81 58
Lambton	35 97	25 57	38 76	104 58	65 25	88 72	79 36	45 60	71 89
Huron	52 27	46 27	50 87	120 02	85 45	108 94	115 71	72 50	96 98
Bruce	50 59	46 00	51 04	106 79	63 88	91 03	109 57	68 86	97 60
Group	46 08	41 77	48 17	111 55	74 57	99 02	112 06	70 06	96 70
Grey	70 79	46 96	59 03	114 03	83 27	102 39	105 73	72 96	94 04
Simcoe	58 87	50 96	55 40	115 61	101 56	100 25	117 76	94 39	96 73
Group	64 59	49 01	57 20	114 80	93 34	101 26	108 93	79 33	94 79
Middlesex	42 09	26 85	40 05	110 88	72 07	90 94	87 81	54 72	84 03
Oxford	40 00	33 58	40 77	112 77	91 73	104 30	107 78	63 38	100 23
Brant	48 29	34 13	43 81	142 38	76 17	119 25	113 66	58 37	102 84
Perth	57 24	26 66	47 27	124 11	60 33	109 37	109 31	57 91	93 62
Wellington	58 96	51 69	52 34	115 29	63 61	88 02	104 96	77 29	99 58
Waterloo	53 74	37 63	49 54	122 54	88 73	108 53	103 94	58 60	92 91
Dufferin	61 05	53 37	58 98	98 60	84 63	94 10	101 89	86 18	88 43
Group	51 83	38 35	47 53	117 94	77 00	101 39	105 56	67 88	96 72
Lincoln	35 53	28 44	39 93	102 38	64 43	90 55	92 16	75 01	84 17
Wentworth	41 15	35 72	46 62	123 48	54 60	100 32	128 77	71 36	111 78
Halton	42 44	40 63	45 14	115 92	109 20	114 02	131 33	59 28	103 41
Peel	38 01	36 04	40 73	108 05	79 72	88 24	114 18	74 78	83 89
York	46 60	48 37	44 77	127 26	90 09	116 50	108 54	71 82	94 13
Ontario	45 10	51 60	53 35	137 03	104 01	119 48	125 44	91 20	100 37
Durham	43 46	58 29	50 71	102 06	114 11	103 26	106 50	88 92	97 99
Northumberland	44 96	42 27	42 44	113 09	98 01	96 02	115 20	98 50	96 33
Prince Edward	34 64	29 39	39 03	90 09	40 95	66 18	97 54	22 80	63 05
Group	42 78	43 63	45 30	118 47	91 23	105 65	118 79	84 21	98 96
Lennox and Addington	38 23	51 55	48 19	114 35	84 63	81 73	68 35	51 30	62 43
Frontenac	37 21	29 30	39 05	60 17	61 70	70 12	67 58	51 98	67 35
Leeds and Grenville	45 14	30 85	49 54	97 65	87 36	88 37	91 90	77 75	83 61
Dundas	73 10	32 44	58 30	126 00	42 04	84 69	72 45	57 00	68 26
Stormont	48 73	21 61	48 86	78 75	81 90	62 05	97 28	57 00	73 29
Glengarry	49 04	20 02	47 23	78 75	56 78	63 73	134 40	51 30	99 69
Prescott	72 25	43 68	59 38	94 82	69 62	80 69	83 97	66 80	89 54
Russell	54 49	41 72	44 46	96 39	85 45	91 04	105 73	109 44	104 38
Carleton	56 79	63 52	55 08	97 65	84 08	85 29	97 28	85 04	82 47
Renfrew	57 77	86 45	64 39	122 22	83 27	78 48	85 25	88 46	74 06
Lanark	55 95	63 47	56 88	131 36	101 01	98 02	96 51	91 20	82 15
Group	51 75	46 42	52 18	99 76	78 61	83 38	93 98	81 54	80 83
Victoria	61 53	65 43	55 41	102 69	110 84	107 25	89 60	83 90	89 34
Peterborough	48 86	67 75	50 16	129 78	93 09	92 49	102 40	95 99	80 91
Haliburton	54 05	60 88	54 05	107 10	54 87	92 00	78 59	72 96	70 78
Hastings	43 19	55 46	51 60	85 37	81 63	87 57	81 41	67 49	69 66
Group	50 27	61 28	52 43	110 24	96 73	96 87	91 43	82 73	83 47
Muskoka	56 17	74 76	59 85	78 75	106 74	72 94	96 26	94 16	75 76
Parry Sound	64 01	71 84	68 59	55 13	63 34	75 00	72 45	84 13	76 88
Nipissing	62 02	....	62 02	63 00	....	63 00	76 80	....	76 80
Algoma	77 53	84 18	77 32	63 00	68 25	70 63	102 40	51 30	73 46
Group	64 67	76 27	66 62	68 90	89 41	72 57	88 58	81 27	75 51
The Province	49 21	44 80	48 93	110 74	83 20	97 36	108 44	75 97	94 94

VALUES PER ACRE—ALL FIELD CROPS.

TABLE XVII. Showing by County Municipalities and groups of Counties in Ontario the average market value in 1889 and 1890 of all field crops and by groups as in Table XI; also the yearly average of the first group for nine years 1882-90, of the second group for six years 1885-90, and a yearly average of all crops derived from the aggregate in Table XII and corresponding acreage.

Counties.	Wheat, barley, oats, rye and pease.			Corn, buckwheat, beans, hay, potatoes, carrots and turnips.			All field crops.		
	1890.	1889.	1882-90.	1890.	1889.	1885-90.	1890.	1889.	Yearly average
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Essex	12 24	11 76	15 12	18 98	15 62	19 60	15 62	13 69	17 41
Kent	14 54	12 12	15 54	20 62	17 30	18 94	17 51	14 43	17 12
Elgin	13 83	11 65	14 88	17 40	19 32	18 48	15 34	14 91	16 39
Norfolk	12 10	9 97	12 96	16 02	17 07	16 33	13 67	12 80	14 35
Haldimand	10 41	10 42	12 61	14 20	14 45	14 51	11 77	11 95	13 33
Welland	10 78	10 74	12 42	15 72	15 67	15 15	13 39	13 50	13 87
Group	12 55	11 17	14 08	17 69	16 69	17 94	14 86	13 63	15 62
Lambton	11 85	11 51	14 09	16 14	16 48	17 34	13 44	13 41	15 34
Huron	14 32	10 95	14 56	22 13	20 63	22 17	17 09	14 30	17 13
Bruce	14 55	9 42	13 90	19 90	18 79	20 73	16 62	12 87	16 38
Group	13 81	10 53	14 23	19 91	18 98	20 51	16 07	13 59	16 47
Grey	12 80	10 31	12 96	24 16	19 73	21 29	17 34	13 88	16 13
Simcoe	13 32	12 70	14 31	20 85	21 08	20 55	15 55	15 10	16 14
Group	13 07	11 53	13 63	22 84	20 27	20 99	16 49	14 46	16 13
Middlesex	14 78	11 05	14 87	19 42	18 05	19 01	16 50	13 62	16 36
Oxford	14 55	11 82	15 05	24 61	20 74	23 66	18 45	15 12	18 26
Brant	14 32	12 44	14 57	27 76	21 80	23 32	19 14	15 69	17 63
Perth	15 17	11 55	15 30	24 94	18 59	22 80	18 56	13 89	17 82
Wellington	13 85	12 34	14 28	28 94	24 70	28 36	19 24	16 66	19 27
Waterloo	14 92	12 86	15 61	26 40	21 27	26 02	18 44	15 40	18 89
Dufferin	12 42	10 66	13 22	24 98	21 63	21 78	16 15	14 23	15 96
Group	14 37	11 80	14 76	24 91	20 85	23 56	18 07	14 93	17 82
Lincoln	11 47	12.03	13 56	16 83	15 63	16 29	13 97	13 91	14 92
Wentworth	12 42	10 71	14 29	26 19	20 75	22 12	17 73	14 61	17 35
Halton	12 51	14 31	14 68	21 50	18 80	19 32	15 44	15 87	16 32
Peel	13 00	12 95	15 05	20 38	19 30	18 72	14 76	14 56	16 02
York	13 13	13 59	15 55	23 02	21 95	20 98	15 95	15 88	17 11
Ontario	11 00	12 81	14 54	33 90	31 54	31 71	18 36	18 15	19 68
Durham	9 97	11 66	13 63	24 77	27 19	25 28	14 52	15 83	16 84
Northumberland	10 68	9 94	11 80	18 83	20 73	18 86	13 71	13 49	14 20
Prince Edward	11 21	10 17	10 80	14 41	16 72	14 89	12 46	12 32	12 25
Group	11 75	12 14	13 96	22 88	22 02	21 47	15 44	15 24	16 40
Lennox and Addington	9 53	10 42	11 43	13 31	16 34	14 21	11 44	12 98	12 61
Frontenac	9 71	8 77	11 43	15 06	16 63	13 80	12 55	12 66	12 63
Leeds and Grenville	9 44	9 39	12 02	14 62	17 42	15 88	12 43	13 83	14 18
Dundas	10 72	9 28	13 69	15 54	17 74	19 27	13 29	13 45	16 42
Stormont	11 68	9 02	13 08	13 62	18 58	18 44	12 80	14 28	15 93
Glengarry	9 78	8 95	11 87	13 19	18 99	19 59	11 52	14 12	15 55
Prescott	10 87	8 57	11 49	14 79	17 21	18 06	12 78	12 68	14 56
Russell	11 99	9 64	12 11	16 47	18 20	17 68	13 95	13 33	14 54
Carleton	11 48	11 11	13 18	17 91	19 82	19 61	14 17	14 48	15 79
Renfrew	11 41	13 90	12 52	14 19	16 40	14 55	12 54	14 95	13 39
Lanark	10 49	9 89	12 10	14 43	17 64	16 65	12 36	13 55	14 35
Group	10 57	10 27	12 25	14 82	17 62	16 65	12 68	13 75	14 35
Victoria	12 08	11 70	13 17	20 30	24 20	21 58	14 52	14 98	15 46
Peterborough	11 42	10 70	12 32	19 47	20 78	16 63	14 06	13 62	13 67
Haliburton	10 90	10 53	10 54	13 98	14 55	15 36	12 50	12 69	13 29
Hastings	11 19	11 16	11 80	16 02	16 95	15 98	13 29	13 41	13 42
Group	11 56	11 20	12 38	17 79	19 44	17 49	13 84	13 93	14 11
Muskoka	11 52	9 80	11 22	19 65	19 06	18 77	16 46	15 47	16 08
Parry Sound	10 97	8 95	11 95	18 22	20 12	18 84	15 15	15 43	15 88
Nipissing	12 17	.... ..	12 17	19 12	....	19 12	16 67	....	16 67
Algoma	13 03	13 45	15 63	20 69	19 96	20 02	16 66	16 21	17 60
Group	11 99	11 17	13 17	19 51	19 55	19 11	16 21	15 71	16 58
The Province	12 54	11 35	13 73	19 87	19 35	19 69	15 42	14 37	16 01

FARM WAGES.

TABLE XVIII. Showing by County Municipalities and groups of Counties the average wages of Farm Laborers and Domestic Servants in Ontario in 1889 and 1890.

Counties.	Farm laborers.								Domestics per month with board.	
	Per year—				Per month in working season—					
	With board.		Without board.		With board.		Without board.			
	1890.	1869.	1890.	1889.	1890.	1889.	1890.	1889.	1890.	1889.
	$	$	$	$	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Essex	159	162	253	269	16 60	17 71	26 53	26 24	6 71	7 81
Kent	161	167	256	257	17 49	17 83	27 39	25 97	6 81	7 08
Elgin	158	173	244	257	16 89	17 55	25 47	25 48	6 51	7 15
Norfolk	151	152	235	236	15 39	16 18	23 97	23 92	5 63	6 00
Haldimand	145	153	241	240	16 83	16 86	25 67	25 62	6 32	6 71
Welland	146	146	250	234	16 37	16 76	26 93	25 17	6 47	6 80
Group	154	160	247	249	16 65	17 19	25 94	25 45	6 40	6 93
Lambton	160	162	263	264	17 18	18 47	28 21	26 90	6 66	6 82
Huron	154	163	252	248	16 48	17 90	26 15	26 58	6 21	6 32
Bruce	153	164	256	245	16 56	17 86	27 08	26 00	5 83	6 24
Group	155	163	256	250	16 72	17 98	27 04	26 39	6 18	6 38
Grey	158	157	253	241	16 58	16 97	26 32	25 59	5 75	6 04
Simcoe	152	163	263	260	16 92	18 00	26 10	27 41	5 81	6 71
Group	156	160	257	253	16 73	17 44	26 23	26 66	5 77	6 33
Middlesex	154	161	261	250	16 74	17 09	26 90	25 24	6 47	6 86
Oxford	161	161	248	249	16 42	17 45	25 06	25 26	6 39	6 75
Brant	156	160	250	241	16 51	16 45	25 17	23 65	6 50	6 99
Perth	154	158	240	240	16 77	17 27	27 22	25 72	6 33	6 53
Wellington	160	163	252	246	16 38	17 16	26 69	26 08	6 37	6 61
Waterloo	153	158	251	250	15 81	17 33	25 67	26 40	6 13	7 18
Dufferin	158	164	255	254	17 39	17 88	27 82	25 00	6 17	6 66
Group	157	161	251	245	16 54	17 20	26 24	25 31	6 36	6 76
Lincoln	149	157	245	257	17 14	17 92	26 35	26 71	6 03	6 52
Wentworth	153	162	251	250	16 72	18 27	26 59	26 17	6 62	7 05
Halton	158	170	277	259	17 08	18 07	27 81	26 65	7 03	7 47
Peel	162	170	256	259	17 55	18 23	27 10	25 91	6 97	7 44
York	169	170	264	260	17 49	17 72	27 26	26 72	7 04	7 33
Ontario	166	162	251	243	17 15	17 01	27 17	25 32	6 27	6 79
Durham	154	160	275	241	16 01	16 55	26 10	24 30	6 41	6 73
Northumberland	150	156	245	231	16 14	16 64	24 47	23 98	5 69	6 41
Prince Edward	151	151	218	221	15 61	16 72	23 56	22 47	5 48	5 67
Group	159	163	254	248	16 87	17 44	26 34	25 54	6 42	6 86
Lennox and Addington	155	152	227	228	16 48	16 84	24 03	23 44	5 44	5 56
Frontenac	151	155	254	235	17 06	18 76	26 58	27 34	5 95	7 43
Leeds and Grenville	153	159	243	236	16 50	18 72	25 29	26 43	6 57	6 83
Dundas	148	150	291	231	17 47	17 19	29 69	26 11	6 72	7 00
Stormont	153	166	238	271	17 05	17 75	27 15	26 88	6 13	6 23
Glengarry	151	146	249	244	16 95	18 07	27 18	26 91	6 33	6 46
Prescott	179	162	279	236	18 05	18 18	27 68	26 78	4 80	6 17
Russell	159	166	253	290	17 35	18 18	26 76	28 50	5 08	5 85
Carleton	162	169	261	254	17 17	17 67	27 83	26 33	7 08	6 98
Renfrew	160	164	255	251	17 50	17 60	28 87	26 21	5 31	5 60
Lanark	161	162	254	256	17 25	18 12	27 19	27 00	6 59	6 59
Group	159	159	253	241	17 17	17 92	26 86	26 24	6 00	6 37
Victoria	168	167	263	267	17 45	18 04	25 77	27 00	6 19	6 41
Peterborough	157	171	272	265	16 46	17 57	25 75	26 52	6 40	7 15
Haliburton	153	165	228	256	17 69	18 07	26 41	26 25	4 87	4 92
Hastings	158	159	249	260	16 26	17 39	25 19	26 46	5 69	6 11
Group	160	165	258	263	16 77	17 67	25 68	26 55	5 93	6 32
Muskoka	159	158	252	257	19 53	19 23	28 33	28 82	6 46	6 55
Parry Sound	173	179	298	295	18 85	18 58	29 04	28 86	5 85	5 83
Nipissing	188	......	297	....	20 61	......	32 28	.....	6 22	......
Algoma	181	182	257	278	20 19	20 72	29 68	28 82	7 24	6 81
Group	174	175	280	278	19 74	19 38	29 59	28 83	6 40	6 32
The Province	157	162	253	249	16 88	17 59	26 56	26 01	6 23	6 61

II

THE AGRICULTURAL COLLEGE
AND
EXPERIMENTAL STATION.

AGRICULTURAL COLLEGE
GUELPH,
ONT.
LABORATORY
FARM BUILDINGS
PART OF FARM, FROM SOUTH-WEST

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MINISTER OF AGRICULTURE

Hon. John Dryden, Toronto.

Ontario Agricultural College and Experimental Farm Guelph, under control of the Minister of Agriculture.

OFFICERS.

James Mills, M.A.	President.
Thomas Shaw	Professor of Agriculture and Farm Superintendent.
C. C. James, M.A.	Professor of Chemistry.
J. Hoyes Panton, M.A., F.G.S.	Professor of Natural History and Geology.
F. C. Grenside, V.S.	Professor of Veterinary Science.
H. H. Dean, B.S.A.	Professor of Dairy Husbandry.
E. Lawrence Hunt, B.A.	Assistant Resident and Mathematical Master.
Captain Walter Clarke	Instructor in Drill and Gymnastics.
C. A. Zavitz, B.S.A.	Assistant Superintendent of Experiments.
George Harcourt, B.S.A.	Assistant Chemist.
A. McCallum	Bursar.

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Secretary of Board	A. Blue.

SIXTEENTH ANNUAL REPORT

OF THE

ONTARIO AGRICULTURAL COLLEGE

AND EXPERIMENTAL FARM.

GUELPH, January 2nd, 1891.

To the Honourable JOHN DRYDEN,

Minister of Agriculture :

DEAR SIR,—I have the honor to submit herewith the Sixteenth Annual Report of the Ontario Agricultural College and Experimental Farm.

In this Report we have reviewed briefly the work of the year 1890 under the following heads:—

PART I.—REPORT OF THE PRESIDENT.
PART II.—REPORT OF THE PROFESSOR OF GEOLOGY AND NATURAL HISTORY.
PART III.—REPORT OF THE PROFESSOR OF CHEMISTRY.
PART IV.—REPORT OF THE PROFESSOR OF VETERINARY SCIENCE.
PART V.—REPORT OF THE FOREMAN OF THE HORTICULTURAL DEPARTMENT.
PART VI.—REPORT OF THE PHYSICIAN.
PART VII.—REPORT OF THE PROFESSOR OF AGRICULTURE.
PART VIII.—REPORT OF THE ASSISTANT DIRECTOR OF EXPERIMENTS.
PART IX.—REPORT OF THE ASSISTANT IN THE DEPARTMENT OF DAIRYING.

I have the honor to be, sir,

Your obedient Servant,

JAMES MILLS,
President.

PART I.

REPORT OF THE PRESIDENT.

Once more we are called upon to give an account of our stewardship. Another year has gone with its labors, cares, and anxieties; and what shall we say of the results, in so far as they affect our students, ourselves, and the interests of agriculture throughout the Province which we have the honor to represent?

COLLEGE VACATIONS AND FARMERS' INSTITUTES.

It may perhaps seem strange to introduce the question of our college vacations at the outset, and it is scarcely what one would expect in an annual report of the college. But within the last two years a good deal has been said by a few persons upon this question; and less than six months ago a misleading letter on the subject was sent the rounds of the Ontario press, with a view to create the impression that the President of the college was very much to blame, that farmers would not send their sons to the college, and that the interests of Canadian agriculture were suffering, all because of a change which was made in the length of our Christmas vacation six years ago. This letter was professedly written by a farmer, explaining why young farmers would not take a course at the Ontario Agricultural College; but in reality it was written by one who never wrought a month on a farm in his life. Under these circumstances, I think it is proper that I should say a few words by way of explanation and self-defence.

TOTAL LENGTH OF VACATIONS UNCHANGED.

During all the time of my predecessors in office and for the first five years of my administration, there were three vacations each year, as follows:—

At Christmas	½ month.
At Easter	½ "
At the end of the college year (31st August)	1 "
Total	2 months.

But since the beginning of the year 1885, there have been only two vacations—

At Christmas	1 month.
At the end of the college year (31st August)	1 "
Total	2 months.

REASONS FOR CHANGING VACATIONS.

I was not long in the position which I now occupy, as head of the institution, till I discovered that we (the professors of the college), were not reaching the agriculturists of this Province. The great majority of the farmers were personally unacquainted with the professors. They had heard very unfavorable reports of them ; but they knew little or nothing about either their attainments, their conduct, or the work which they were endeavoring to do. This state of things being very undesirable, I naturally sought for some means of bringing the professors and the farmers together. The farmers were quite willing to hear the professors, but the difficulty was to find a time suitable for both. Some of the professors were free in the summer months, but farmers could not attend public meetings at that season of the year ; and the farmers had a slack time in January and February, but the professors were then engaged with their college work. So, after considerable thought and deliberation on the part of the Hon. A. M. Ross and myself, it was decided, in the fall of 1884, to abolish the Easter vacation ; to add two weeks to the Christmas vacation (making it a month) ; to organize Farmers' Institutes ; and to send the professors throughout the Province to address institute meetings during the last three weeks of the Christmas vacation (2nd to 22nd January inclusive).

RESULTS OF CHANGING VACATIONS.

By the change in the college vacations, the professors were enabled to attend institute meetings, without interfering with their college work. We went out in January, 1885. We have done so every winter since, and the beneficial results have far exceeded our most sanguine expectations. The work began on a small scale, but the number of institutes has increased so rapidly that we have had to arrange for no less than 90 meetings in January, 1891. The professors have been benefited by listening to statements of experience made by practical farmers, and the farmers have been helped by the enunciation and discussion of the scientific principles which underlie the best farm practice. The college has been strengthened by the increased and ever increasing confidence of the farming community ; and the country at large has been stirred up to a broader, deeper, and more intelligent interest in the great subject of agriculture. All this, as intimated above, is, I think, largely the result of arranging our college vacations in such a way that the professors are able to spend three weeks of the most suitable time each year at institute meetings throughout the Province.

OBJECTION URGED.

From the first, we admitted that there was one objection to the present arrangement, viz., that the students are absent from the college in January two weeks longer than is desirable. January is a good month for study, and we would prefer to have our boys return from their holidays two weeks sooner than at present. After all, this is only a slight objection, because it is always difficult for us to find suitable out-door employment for our students in winter ; and for that reason two weeks in the month of June are of more advantage to a boy at an agricultural college than the same length of time in any of the winter months.

For the first four years after the change was made (the abolition of the Easter vacation and the addition of two weeks to the Christmas vacation, to enable professors to assist at farmers' institute meetings), no fault was found by any one. No objection was raised by students, by parents, nor by anyone else till about two years ago, when an agitation was begun, not by students nor by their parents, but by one or two others, to have our Christmas vacation made two weeks shorter and lectures end two weeks earlier in June—say on the 6th instead of on the 20th of that month.

To this agitation I have hitherto been opposed, because I have felt that its success would mean the severance of the connection which now exists between the College and the Farmers' Institutes.

Conclusion on This Question.

In conclusion, however, I wish to say that I have no personal interest to serve in this matter. Already I have had a great amount of labor in connection with the Institutes—voluntary labor for which I have received no remuneration; and I have no objection whatever to any change which will benefit both the college and the institutes, or strengthen either without injuring the other. So, if it is thought better for the College, the Institutes, and the Province at large, that our Christmas vacation should be made two weeks shorter and our professors should give up the institute work, with the exception of an occasional meeting—if, I say, this is thought better by those who are most interested, I shall offer no opposition to the proposed change.

WORK IN 1890.

The work in the different departments of the Institution has gone on smoothly and successfully during the past year. Nothing specially noteworthy has occurred; but good work has been done in all the departments.

The College.

There has been no change in our staff during the year. Full courses of lectures have been given in all the departments—

I. Agriculture, Live Stock, and Dairying;
II. Natural Science;
III. Veterinary Science;
IV. English Literature and Political Economy;
V. Mathmetics and Book-keeping.

As usual, we have laid special stress upon the three branches embraced in department No. 1. We have sought to keep prominently in view what we believe to be the first duty of an agricultural college, viz., to make its students good farmers—men well versed in the theory and practice of general agriculture, stock-breeding, stock-feeding, dairying, etc. At the same time, we have endeavored to do thorough and sufficiently comprehensive work in all the other departments. So far as we are aware, nothing has been neglected; and the students have done as hard and good work as those of any former period. We never had a more pleasant and successful year.

We have not had the pleasure of seeing any new buildings erected during the year; but we have done quite a little in the way of repairs and alterations—laying new hardwood instead of old pine floors in the College halls, painting and papering the President's office, putting in a new high pressure steam-boiler, fitting up a hospital in the College, and making the alterations necessary to get a new Y. M. C. A. hall.

For several years, the student's weekly prayer-meeting and our Sunday Bible-class were held in one of the College class-rooms, but always with more or less inconvenience or interruption. At length, in the fall of the year 1888, a branch of the Young Men's Christian Association was organized in the College. From that time the religious activity of the students gradually increased, and the necessity for a separate room for their meetings became more and more apparent. So in September last, by removing two or three partitions and by some expense in flooring, painting, papering, etc., we succeeded in making a very commodious, bright, and beautiful room, which shall henceforth be known as the Y. M. C. A. Hall. This hall is well lighted, is furnished with chairs for 100 students, and with a good organ for the musical part of their services. The organ, I may add, was purchased by the students themselves.

Smoking in the College.

In the changes which were necessary in order to make the Y. M. C. A. Hall, I had to abolish the old smoking-room. This I did without hesitation; but at the same time I set apart another room for the use of smokers, with the new regulation that it should be open only three times a day, for three-quarters of an hour immediately after breakfast, after dinner, and after tea ; and that at those times it should be under the direct control and supervision of one of the College officers. None but smokers are admitted to this room ; and since the change, I am pleased to say, there have been only three smokers in the College.

COLLEGE HOSPITAL.

Owing to the very healthful situation of the College, and the mercies of a kind Providence, we have hitherto been almost entirely free from all the most serious forms of disease. During the eleven and a half years of my connection with the Institution, we have not had a single case of typhoid fever, and it is doubtful whether we have had a case of real diphtheria. During the same period we have had only one death, and that was caused by hemorrhage of the lungs in the case of a young Englishman who came to this country in a very delicate state of health. So, all considered, I think I may say that we have been singularly fortunate in our exemption from sickness. At the same time we must admit that we have not been entirely free, We have had attacks of measles two or three times ; and in the fall of the year, our students are frequently troubled with colds, sore throats, and various ailments which arise from exposure, sudden changes of temperature, and other well-known causes. In all such cases, prompt attention is required ; and, in some instances, suitable means of isolation from the rest of the students are almost a necessity.

Hitherto, however, we have not had any room or rooms properly heated, furnished, and insolated for the use of sick students. Our faithful physician, Dr. E. W. McGuire, has often and persistently urged the need of a hospital of some kind in the College ; but various difficulties stood in the way till a few weeks ago, when the Minister of Agriculture gave his consent to the alterations and expenditure necessary to fit up, heat, and furnish a section in the upper story of one of our dormitory buildings for hospital purposes. The work was at once undertaken ; and already we have a first-class hospital on a small scale—a medium-sized room for one bed, a larger room for two beds, and a bath-room, with hot and cold water, bath-tub, wash-basin, and water-closet, all well heated, well lighted, well ventilated, nicely painted, suitably furnished, and properly isolated from the rest of the building.

DEPARTMENT OF CHEMISTRY.

The chief items of general interest in this department are the analysis of sugar-beets and a change in our method of teaching elementary chemistry. During the autumn months, a good deal of time was spent in analysing samples of sugar-beets which were sent here from various parts of the Province. One hundred and seventeen samples were analysed, and the results were published in a bulletin issued by the Department of Agriculture about the middle of December. A fuller statement of facts and conclusions will be found in Professor James's report in Part III. of this Volume.

Until 1890, we followed the usual method of teaching the first principles of chemistry to our students, that was, by a systematic course of lectures and experiments in the class-room. This method was fairly successful ; but, about six months ago, Professor James decided to introduce the method of putting every student to work in the laboratory from the very beginning. Our chemical lecture-room and the student's portion of the laboratory are close together. Hence it takes only a moment to pass from the one to the other. At the beginning of the term, every student has a place allotted to him in the laboratory and the necessary outfit of chemicals and apparatus placed at his disposal ; and the work is carried on daily by the Professor illustrating and stating a few facts or principles in the lecture-room, after which the students proceed at once to repeat the experiments in the laboratory, each working by himself and all under the supervision and direction of the Professor. By this method the students do not advance so quickly, but they take greater interest in their work and understand it much better.

DEPARTMENT OF NATURAL HISTORY.

For a full account of the work done in this department, I would refer the reader to Professor Panton's report in Part II. of this Volume. There will be found many items of interest relating to the department proper, and the annual statement of facts and figures regarding our reading-room, library, and museum. Professor Panton has given much time to the practical study of botany during the last two or three years, and has devoted special attention to the noxious weeds of this Province. Early last year, at Professor Panton's request, and with a view to assist him in his work, we constructed a large case with a glass front, 54 feet long, against one wall of the museum; and, for the information of students and visitors, Professor Panton is placing in this case a large number of samples of weeds collected from different parts of the Province and arranged so as to exhibit, as far as possible, the root, stem, leaves, and flower of each sample.

DAIRY DEPARTMENT.

In the Department of Dairying, we have been without a Professor during the past year; but the work has not been neglected. The usual course of lectures in that department was given in the spring by our old Professor of Dairying, J. W. Robertson, who is now employed as Dairy Commissioner for the Dominion; and the work in connection with the Creamery and Experimental Dairy has been successfully managed throughout the year by George Harcourt, B.S.A., who has been acting as assistant in the Dairy Department.

Mr. Harcourt, having rendered faithful and efficient service in the Dairy Department, has lately been appointed to the position of assistant chemist, with an increase of $200 a year in his salary; and H. H. Dean, B.S.A., also one of our own graduates, has been chosen for the professorship of dairying, to enter upon his duties on the first January, 1891. Mr. Dean took Professor Robertson's full course of lectures on dairying, stood high in his final university examination on that subject, spent the past summer at practical work in the creameries and cheese factories of Ontario, and has, for the last few months, been employed as dairyman of the New York Experiment Station, at Geneva, N. Y. Mr. Dean has been brought up on a Canadian farm. He is a good scholar, a fluent speaker, and a hard worker. Hence we entertain hopes that he will be successful in the important position which he has been called upon to fill.

EXPERIMENTS.

Our experimental work has been rapidly extending within the last year or two. Since C. A. Zavitz, B. S. A., was appointed assistant director in that department and allowed to devote his whole time and thought to it, much valuable work has been done. Fifty acres, divided into plots varying from one acre to 1-20th of an acre, are now devoted to experiments; and during the past year, (under the supervision of Professor Shaw), Mr. Zavitz, with such help as he needed, and with the special assistance of Mr. Alexander Cuppage in feeding and looking after cattle and pigs, has made a large number of more or less important experiments—has tested 270 varieties of grain (wheat, oats, peas, and barley), thirty varieties of potatoes, and ninty varieties of turnips, beets, and mangels, and has also tried different methods of cultivation, several kinds of fertilizers, different dates of seeding, etc. With cattle and pigs also, a number of experiments are being conducted, in order to determine, as far as possible, the respective merits of different breeds and the comparative values of various kinds of food and methods of feeding. For full information on these points, see Professor Shaw's and Mr. Zavitz's report in Part VII. of this volume.

FARM PROPER.

On the farm proper, Professor Shaw, with the help of Mr. J. E. Story, our very faithful and efficient farm foreman, has continued his special efforts for the destruction of noxious weeds, a few varieties of which, especially Canadian thistles, are still more numerous than they should be on a model farm. He has also spent much time, a good deal of hard work, and a considerable sum of money in grading our farm lane, and in grading and gravelling some of the public roads adjoining the farm. When this work is finished, it will add very much to the beauty of the farm and its surroundings.

GARDEN, LAWN, ETC.

The work on our large lawn and in the vegetable garden has gone on as usual during the year. Nothing specially noteworthy has occurred ; and all I need do, is to emphasise and re-emphasise our great need of new Green and Propogating Houses, in order to make the Horticultural Department of real service to the College and the country.

Last spring, our gardener, Mr. James Forsyth, made a considerable addition to our fruit garden, by setting out in the field adjoining his own residence a considerable selection of trees and plants, such as he thought necessary to make our fruit supply all that is required. This addition consists of 217 apple trees, 20 pear trees, 137 grape vines, 245 gooseberry bushes, 271 currant bushes, 815 raspberry plants, and 1,830 strawberry plants.

CLUMPS OF FOREST TREES.

It may not be amiss, at this stage in our history, to submit a few notes on the results of our experience in the planting and growing of forest trees. Much might be said on this subject ; but we shall state only a few facts as follows :—

BLACK WALNUT.—In 1881 we planted with black walnuts, from twelve to fifteen inches high, a piece of clay loam, a little less than half an acre, on the side of a slope exposed to the west and north-west winds. The plants were obtained from seed which we had sown two years before, and were set out with a view to form a clump of valuable shade trees. They were set in rows six feet apart and the same distance from one another in the rows. The soil between the rows has been ploughed lightly once a year and cultivated twice, with a little hoeing, to kill weeds and keep the ground open.

Regarding this plantation we beg now to report that the trees have all grown well without damage from frost or any other cause. During last summer they looked quite healthy and seemed likely to do well in future, notwithstanding the severity of our Guelph climate. In the month of August we measured a number of them and found that in nine years they had attained a growth of from twelve to twenty feet high, being $3\frac{1}{2}$ to 5 inches in diameter near the root, and $2\frac{1}{2}$ to $3\frac{3}{4}$ inches in diameter four feet above the ground. About half of them are of the larger size.

We may add that in the cultivation of these walnuts and other trees we have proved beyond doubt that, when the soil around trees is kept clean and loose by stirring occasionally in dry weather, the trees grow much more rapidly than when the ground around them becomes hard or grass is allowed to grow about them.

EUROPEAN LARCH.—In the same year, 1881, we planted also another plot of ground, about a quarter of an acre, with European Larch, of the same size as the walnuts, namely twelve to fifteen inches high. We raised the plants from seed and set them in rows five feet apart and the same distance from one another in the rows. Our object was twofold : (1) to conceal a gravel pit from view, and (2) to test the European Larch in this locality and climate.

For the first five years after planting, the ground was cultivated more or less with the plough, scuffler, and hoe. Since that time the space has been completely occupied, so that we have not had room for either ploughing or hoeing among the trees.

During last summer this plantation presented a beautiful appearance, not only concealing the unsightly gravel pit as we desired, but adding an element of beauty and interest to the landscape. The trees were found to be from twelve to twenty-four feet high, growing nicely and looking very thrifty. They vary in diameter from 3 to 5½ inches near the root, and from 2½ to 4½ inches five feet above the ground.

For the informatian of those who are not familiar with the European Larch, we may say that it is of the same genus as the Canadian Tamarack, which is known as the American Larch (*Larix Americana*). The European Larch resembles the Tamarack, but is a different species and is much more valuable. The timber of the European Larch is difficult to split, is very durable, and in value is equal to Douglas Pine.

I may add that one of the best trees in this plantation is growing on the edge of the gravel ridge in almost pure gravel.

Ash-leafed maple (*Negundo Aceroides*).—We have a third clump consisting of a variety of trees planted in 1882. It would, perhaps, be interesting to compare these trees as to height, thickness, &c., but at present we shall speak of only one species, viz., the ash-leafed maple of Manitoba and the North-west. Among the other trees of this clump several of this so-called maple were planted eight years ago ; and at the present time they are very much larger than any other kind of tree in the plantation, being from twenty two to twenty-five feet high, averaging eight inches in diameter near the root, and six inches in diameter five feet above the ground. The tree is not so handsome as our common hard or soft maple, but it makes a nice shade tree and grows much faster than any other tree on this farm.

Forest tree plantation.—Our gardener, Mr. James Forsyth, who planted and has taken care of the clumps mentioned above, also lately (last spring) replanted a four-acre field with a variety of forest trees—white oak, white ash, black walnut, hickory, maple, catalpa, pine &c. This field was gradually cleared to furnish firewood ; and when the stumps had pretty well rotted, we ploughed it up and took two crops off it (potatoes and peas), after which we ploughed, harrowed, and re-planted it with trees in rows eight feet apart, and in such a way that it can be cultivated in three directions with the plough and scuffler.

We have found that where horse cultivation is to be used, trees in clumps or plantations should not be planted nearer than eight feet, even when it is intended to remove some of them after a few years growth.

Importance of replanting.—There are many barren knolls and stony or gravelly fields throughout the Province that would be greatly improved by replanting. They are now only so many eye-sores in the landscape, little or no use to the owners ; and in most cases they detract from the value of good land in the immediate neighborhood. If replanted, protected, and looked after for a few years, these same pieces of land would soon become the most beautiful spots in the country ; and before long the trees grown on them would be a source of profit to the growers.

Students in Attendance.

The attendance during the past year has been quite satisfactory—twelve more than the year before. The total number on the roll is 146, seventy-five per cent. of whom are from the Province of Ontario. Thirty-three counties of Ontario are represented, and the largest representation is from the counties of Grey, Middlesex, York, Prince Edward, Huron, and Waterloo. Of the forty-nine who entered in October last, seventy-seven per cent. are farmers' sons ; and I have no hesitation in saying that never before in the history of the College were our students so quiet, industrious, and well behaved as they have been during the term which ended on the 22nd of December last.

ANALYSIS OF ROLL.

Counties, Etc.	No. of Students.	Counties, Etc.	No. of Students.
Brant	4	Norfolk	2
British Columbia	4	Northumberland	2
Bruce	2	Northwest Territories	2
Carleton	3	Nova Scotia	4
Cape Breton	1	Ontario (County)	2
Dufferin	2	Oxford	4
Dundas	1	Peel	2
England	16	Perth	2
France	2	Prince Edward County	6
Frontenac	1	Prince Edward Island	1
Grey	8	Quebec	3
Haldimand	1	Rainy River District	1
Hamilton	1	Scotland	1
Hastings	2	Simcoe	3
Huron	5	Stormont	2
India	2	Switzerland	1
Kent	4	Toronto	6
Lanark	2	Victoria	1
Lincoln	4	Waterloo	5
Leeds	4	Welland	3
Lennox	2	Wellington	4
Middlesex	6	Wentworth	3
Muskoka	2	York	6
New Brunswick	1		
New York, U. S. A	1	Total	146

RELIGIOUS DENOMINATIONS.

Methodists	44	Evangelical Association..	1
Episcopalians.	39	Mennonites	1
Presbyterians	39	Plymouth Brethren	1
Baptists	6	Disciples	1
Congregationalists	6		
Roman Catholics	5	Total	146
Friends	3		

AGE OF STUDENTS.

11	16 years	4	23 years
20	17 "	6	24 "
24	18 "	6	25 "
24	19 "	4	26 "
20	20 "	2	27 "
11	21 "	2	28 "
12	22 "	1	29 "

Average age, 20 years.

COUNTY STUDENTS.

Of those in attendance during the year, forty-five were nominated by county councils, and as a consequence were exempted from the payment of tuition fees. The counties represented were the following :—

Brant, Bruce, Carleton, Dufferin, Dundas, Frontenac, Grey, Hastings, Haldimand, Huron, Kent, Lanark, Leeds, Lennox, Lincoln, Middlesex, Muskoka, Norfolk, Northumberland, Ontario, Peel, Prince Edward, Rainy River District, Simcoe, Stormont, Victoria, Waterloo, Welland, Wellington, York.

CLASS-ROOM WORK.

Our class-room work has gone on as usual during the past year. The candidates for degrees were all successful in passing their examinations, and a fair proportion of first and second year students gained a respectable standing ; but the number of failures is still much larger than it should be.

Examiners.

The third year examinations were conducted by the University of Toronto, and those of the first and second years by the professors of the College and four other gentlemen to whom we are much indebted.—

E. C. Jeffrey, B.A	English Literature.
W. A. Douglas, B.A	Political Economy.
E. L. Hill, B.A	Botany.
J. A. Craig, B.S.A.	Entomology.

Bachelors of the Science of Agriculture.

Five candidates for the degree of B.S.A. were examined in the month of May. These candidates were all successful, and received their degrees at the regular convocation of the University of Toronto, on the 10th of June. The list is as follows :—

Brodie, G. A.	County of York, Ont.
Dean, H. H.	" Brant, Ont.
McCallum, W.	" Middlesex, Ont.
Monteith, S. N	" Perth, Ont.
Shantz, A.	" Waterloo, Ont.

Recipients of Associate Diplomas.

Twenty-three young men, having completed the course of two years, received diplomas admitting them to the status of Associates of the College. The diplomas were presented by the Hon. Charles Drury, Minister of Agriculture, at our closing exercises on the 30th of June, and the names of the recipients are as follows :—

Brown, H. H	Chatham, Kent, Ont.
Buchanan, D	Hensall, Huron, Ont.
Campbell, C. S.	Brantford, Brant, Ont.
Cowan, J. H	Galt, Waterloo, Ont.
Cowan, R. E	Galt, Waterloo, Ont.
Dolsen, W. J	Chatham, Kent, Ont.
Elliott, R.	Seaforth, Huron, Ont.
Field, H.	Cobourg, Northumberland, Ont.
Hadwen, G. H.	Mons en Bareul, France.

RECIPIENTS OF ASSOCIATE DIPLOMAS—*Continued.*

Harcourt, J	St. Anns, Lincoln, Ont.
Hewgill, E. A	Heathcote, Grey, Ont.
Holliday, W. B	North Shields, England.
Hutt, H. L	South End, Welland, Ont.
Macfarlane, T. W. R	Ottawa, Ont.
McKergow, J. G	Montreal, Quebec.
Monk, W. D	South March, Carleton, Ont.
Mulholland, F	North Toronto, York, Ont.
Sleightholm, J. A. B	Humber, Peel, Ont.
*Webster, F. E	Creemore, Simcoe, Ont.
*Wells, E	Chilliwhack, B. C.
*Wilson, F. G	Green River, Ontario Co., Ont.
*†Wood, W. D	Cornwall, Stormont, Ont.
Whitley, C. F	Enfield, Middlesex, England.

FIRST-CLASS MEN.

The work in the College is divided into five departments and all candidates who get an aggregate of 75 per cent. of the marks allotted to the subjects in any department, are ranked as first-class men in that department. We would like to have a larger number of such men; but we are determined that none shall be so ranked unless they really deserve it. The following list contains the names of those who gained a first-class rank in the different departments at the examinations in 1890:—

FIRST YEAR.

1. *Burns*, *J. A. S.*, Halifax, N. S.—In two departments; Agriculture and Natural Science.
2. *Carlyle*, *W. L.*, Chesterville, Dundas, Ont.—In two departments; Agriculture and Veterinary Science.
3. *Gibson*, *D. Z.*, Willow Grove, Haldimand, Ont.—In four departments; Agriculture, Natural Science, Veterinary Science, and English Literature.
4. *Harris*, *J. E.*, Calne, Wilts, England.—In one department; Agriculture.
5. *Morgan*, *R. N.*, Kerwood, Middlesex, Ont.—In four departments; Agriculture, Natural Science, English Literature, and Mathematics.
6. *Wilkin*, *F. A.*, Calgary, North-West Territory.—In three departments; Agriculture, Veterinary Science and Mathematics.
7. *Wills*, *H. G.*, Toronto, Ont.—In one department; Mathematics.

SECOND YEAR.

1. *Buchanan*, *D.*, Hensall, Huron, Ont.—In two departments; Agriculture and Veterinary Science.
2. *Cowan*, *R. E.*, Galt, Waterloo, Ont.—In two departments; Agriculture and Veterinary Science.
3. *Hadwen*, *G. H.*, Mons en Bareul, France.—In two departments; English Literature and Mathematics.
4. *Harcourt*, *J.*, St. Anns, Lincoln, Ont.—In three departments; Agriculture, Natural Science, and Veterinary Science.
5. *Hutt*, *H. L.*, South End, Welland, Ont.—In three departments; Agriculture, Natural Science, and Veterinary Science.

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* Required to take Milton's "L'Allegro and "Il' Penseroso" again.

† Has to pass another examination in Veterinary Anatomy.

6. *Sleightholm, J. A. B.*, Humber, Peel, Ont.—In one department; Agriculture.
7. *Whitley, C. F.*, Enfield, Middlesex, England.—In two departments; Agriculture and English Literature.

MEDALLISTS.

Medals were given to the three students who ranked highest in general proficiency in the theory and practice of the second year. The competition was keen, as usual, with the following results :—

Gold Medalist.—H. L. Hutt, South End, Welland, Ont.
First Silver Medalist.—J. Harcourt, St. Anns, Lincoln, Ont.
Second Silver Medalist.—R. E. Cowan, Galt, Waterloo, Ont.

FIRST YEAR PRIZEMEN.

Agriculture and Dairying.—1st, D. Z. Gibson, Willow Grove, Haldimand, Ontario; 2nd, W. L. Carlyle, Chesterville, Dundas, Ont.

Natural Science.—1st, J. A. S. Burns, Halifax, N. S ; 2nd, D. Z. Gibson.

Veterinary Science.—1st, D. Z. Gibson ; 2nd, F. A. Wilkin, Calgary, N. W. T.

English Literature and Composition.—1st, D. Z. Gibson ; 2nd, W. F. Newcomen, Epping, Essex, England.

Mathematics and Book-keeping.—1st, F. A. Wilkin ; 2nd, H. G. Wills, Toronto.

General Proficiency.—1st, D. Z. Gibson ; 2nd, J. A. S. Burns ; 3rd, F. A. Wilkin.

SECOND YEAR PRIZEMEN.

Agriculture, Live Stock, Dairying,—1st, H. L. Hutt ; 2nd, J. Harcourt.

Natural Science.—1st, H. L. Hutt ; 2nd, J. Harcourt.

Veterinary Science.—1st, R. E. Cowan ; 2nd, H. L. Hutt.

English Literature.—1st, C. F. Whitley ; 2nd, G. H. Hadwen.

Mathematics.—1st, G. H. Hadwen ; 2nd, H. L. Hutt.

General Proficiency.—1st, H. L. Hutt ; 2nd, J. Harcourt ; 3rd, R. E. Cowan ; 4th, C. F. Whitley.

CLOSING EXERCISES.

Our closing exercises took place on the 30th June. The weather was fine and the attendance large. There were between 400 and 500 people present from Guelph and the surrounding district, many having driven from fifteen to twenty miles to spend a few hours with us. We were favored especially with the presence of the Hon. Charles Drury, Minister of Agriculture, and Sir Daniel Wilson, president of the University of Toronto. Both these gentlemen took part in the formal exercises and delivered addresses, which were very much enjoyed by those who had the pleasure of hearing them. James Innes, M.P., D. Guthrie, M.P.P., and several other leading-men from Guelph were also present and assisted in the presentation of medals and prizes,

VALEDICTORY ADDRESSES.

The second year men chosen by their fellow students to deliver the Valedictory Addresses at the closing exercises were F. C. Whitley and H. L. Hutt.

FARMERS' INSTITUTES.

The work of the Farmers' Institutes is still increasing in magnitude and importance. We gave assistance at 75 meetings in January, 1890, and have arranged to attend 95 meetings in January and 4 in February, 1891.

The following is the list of Institute meetings to be held in January, 1891, as arranged by myself, under instructions from the Minister of Agriculture, and in consultation with Nicholas Awrey, M.P.P., president of the Central Farmers' Institute:—

DIVISION No. 1.

Prof. Grenside ; T. Raynor, B.S.A.; T. H. Race, Esq.—Tara, 2nd January ; Port Elgin, 3rd January ; Paisley, 6th January ; Walkerton, 7th and 8th January ; Listowel, 9th January ; Milverton, 10th January ; Brussels, 12th and 13th January ; Smith's Hill, 13th and 14th January ; Exeter, 16th and 17th January ; Lucan, 19th January ; Park Hill, 20th January ; Thorndale, 21st and 22nd January.

DIVISION No. 2.

John I. Hobson, Esq.; C. A. Zavitz, B.S.A.; D. W. Beadle, Esq.—New Hamburg, 2nd and 3rd January ; St. Mary's, 6th January ; Wyoming, 7th and 8th January ; Appin, 9th and 10th January ; Chatham, 12th January ; Wallaceburg, 13th January ; Dawn Mills, 14th January ; Belle River and Woodslee, 16th and 17th January ; Kingsville, 19th and 20th January ; Highgate, 21st January ; West Lorne, 22nd January ; Shedden, 23rd January.

DIVISION No. 3.

President Mills ; W. H. McNish, Esq.; L. Woolverton, M.A.—Freelton, 2nd and 3rd January ; Embro, 6th January ; Norwich, 7th and 8th January ; Aylmer, 9th and 10th January ; Delhi, 12th January ; Port Rowan, 13th January ; Vittoria, 14th January ; Caledonia, 15th and 16th January ; Waterford, 17th January ; Welland, 19th January ; Port Colborne, 20th January ; Pelham, 21st and 22nd January.

DIVISION No. 4.

John McMillan, M.P.; F. J. Sleightholm, Esq.; E. D. Smith, Esq.—Weston, 2nd and 3rd January ; Brampton, 6th January ; Milton, 7th January ; Burlington, 8th January ; Hamilton, 9th and 10th January ; Jordan, 12th and 13th January ; St. George, 14th and 15th January ; Burford, 16th and 17th January ; Berlin, 19th and 20th January ; Guelph, 21st and 22nd January.

DIVISION No. 5.

Professor J. H. Panton ; D. E. Smith, Esq., B.A.; and A. H. Pettit, Esq.—Newmarket, 2nd and 3rd January ; Bondhead, 6th January ; New Lowell, 7th and 8th January ; Thornbury, 9th January ; Owen Sound, 12th January ; Markdale, 13th January ; Shelburne, 14th and 15th January ; Erin, 16th January ; Glenallan, 19th January ; Drayton, 20th January ; Durham, 22nd January.

DIVISION No. 6.

*Professor H. H. Dean ; N. F. Fraser, Esq.; *W. Cowan, V.S.; and P. C. Dempsey, Esq.*—Markham, 2nd January ; Uxbridge, 3rd January ; Cannington, 6th January ; Little Britain, 7th and 8th January ; Bobcaygeon, 9th January ; Fenelon Falls, 10th

January; * Peterboro', 12th and 13th January; * Harwood, 14th January; * Keene, 15th January; Warkworth, 16th and 17th January; * Brechin, 19th January; * Orillia, 20th and 21st January; *Alliston, 22nd and 23rd January.

DIVISION NO. 7.

Professor C. C. James; Edward Jeffs, Esq; and G. C. Caston, Esq.—Oshawa, 2nd and 3rd January; Bowmanville, 6th January; Orono, 7th January; Baltimore, 8th January; Cold Springs, 9th January; Picton, 10th January; Napanee, 12th and 13th January; Centreville, 14th and 15th January; Sunbury 16th and 17th January; Delta, 19th January; Lansdowne, 20th January; Lyn, 21st January.

DIVISION NO. 8.

Professor Thomas Shaw; George Harcourt, B.S.A.; and E. Morden, Esq.—Perth, 2nd and 3rd January; Lanark, 6th January; Carp, 7th and 8th January; Renfrew, 9th January; Rockland, 12th and 13th January; Vankleek Hill, 14th and 15th January, Alexandria, 16th and 17th January; Cornwall, 19th and 20th January; Morrisburg, 21st and 22nd January.

SUPPLEMENTARY LIST.

Hon. Charles Drury and Prof. H. H. Dean.—Kenilworth, 3rd February; Bracebridge, 5th February; Utterson, 6th February; Thessalon, 9th and 10th February; Sault Ste. Marie, 11th and 12th February.

In this list the speakers were so arranged that each deputation consisted of a Professor, a practical farmer, and a representative of the Fruit Growers of Ontario. The only exceptions were in the case of Mr. Hobson, Mr. McMillan, and Hon. Charles Drury, who took the place of professors at the meetings for which they were announced. By this arrangement it was thought that the meetings might be made were interesting and profitable to all classes and sections of the farming community.

FINANCIAL STATEMENT.

I.—COLLEGE EXPENDITURE.

(a) *Maintenance.*

1. Salaries and wages	$12,962 58
2. Food—	
Meat, fish, and fowl	2,771 78
Bread and biscuits	559 42
Groceries, butter, and fruit	3,412 33
3. Household expenses—	
Laundry, soap, and cleaning	134 15
Women servants' wages—cooks, housemaids, etc	1,607 60
4. Business Department—	
Advertising, printing, postage, and stationery	1,212 09
5. Miscellaneous—	
Laboratory—chemicals, apparatus, etc	402 51
Library—books, papers, and periodicals	372 13
Medals	71 32
Unenumerated	926 68
	$24,132 59

(*b*) *Maintenance and Repairs of Government Buildings.*

Furniture and furnishings	$ 697 00	
Repairs and alterations	1,134 92	
Fuel	2,275 73	
Light	862 60	
Water	650 00	
Sewage disposal	159 91	
		$5,780 16
		$30,212 75

College Revenue.

1. Tuition fees	$1,655 37	
2. Laboratory fees for gas and chemicals used by third year students	212 00	
3. Balances paid for board, after deducting allowances for work on farm, etc	3,842 66	
4. Fines, breakages, etc	89 33	
5. Charges for supplemental examinations	36 75	
6. Sales of bones	3 61	
7. Sale of old iron	2 00	
		$5,841 72
Net cash expenditure of College		$24,371 03

The net sum voted by the Legislature for the maintenance of the College (see estimates for 1890, pp. 35 and 40) was $26,585. Hence, the unexpended balance for the year is $2,213.97

II.—Farm.

(*a*) *Farm Proper.*

1. Permanent Improvements—fencing, road-making, moving sheep barn, etc	$ 873 87	
2. Farm maintenance—		
Salaries and wages	3,159 52	
Live stock	4,105 43	
Maintenance of stock	1,291 14	
Seeds	227 66	
Binding twine	39 10	
Repairs—lumber, blacksmithing, etc	450 00	
Furniture and furnishings—pails, tools, etc	463 78	
Implements	293 44	
Advertising, printing, postage, and stationery	598 15	
Fuel and light	23 28	
Contingencies	233 72	
		$10,885 22
		11,759 09
Less farm revenue		7,004 49
Net expenditure of Farm Proper		$4,754 60

(b) *Experiments.*

Salaries and wages—		
Assistant Superintendent	$800 02	
Instructor (part wages)	93 74	
Labor	880 26	
		$1,774 02
Seeds		138 23
Fertilizers		40 33
Manures		196 98
Live stock for experimental feeding		10 00
Furniture, furnishings, repairs, etc		365 93
Printing, postage, and stationery,		36 11
Implements		329 93
Feed and fodder—oil cake, etc		99 93
Exhibitions		265 74
Contingencies		8 00
		$3,265 20

III.—EXPERIMENTAL DAIRY.

Salaries and wages—		
Salary of Assistant	$600 00	
Labor	600 80	
		$1,200 80
Live stock—pigs		80 15
Feed and fodder		505 82
Furniture, furnishings, repairs, etc		121 04
Laboratory expenses—gas, chemicals, etc		31 93
Printing, postage, and stationery		22 63
Contingencies		7 62
		$1,969 99
Less revenue—		
Cows sold (capital)	$ 123 15	
Sales of pigs, butter, milk, etc	1,243 71	
		1,369 86
Net expenditure of Experimental Dairy		$600 13

IV.—GARDEN, LAWN, ETC.

Salaries and wages—		
Foreman (part salary)	$ 499 00	
Assistant	440 00	
Second Assistant	216 90	
Teamster	305 25	
Laborers	1,183 34	
		2,644 49
Manure		104 25
Seeds, bulbs, plants, trees, etc		171 23
Furniture, furnishings, repairs, etc		144 09
Fuel and light		26 06
Contingencies		6 05
		3,096 17
Less cash revenue (vegetables and colt sold)		146 30
Net expenditure of Horticultural Department		$2,949 87

V —INSTRUCTION.

Salaries and wages—		
Farm foreman (part salary)	$400 00	
Gardener (part salary)	201 00	
Carpenter (part salary)	400 00	
Instructor (part wages)	125 00	
Cattleman (part wages)	99 99	
		1,225 99
Lumber, nails, oil, paint, etc., for practice		
Furniture, furnishings, tools, etc., for practice		42 25
Fuel		18 87
		$1,287 11

Total net expenditure for Maintenance in all Departments in 1890.

College	$24,371 03
Farm Proper	4,754 60
Experimental Plots and Feeding	3,265 20
Experimental Dairy	600 13
Garden, lawn, etc	2,949 87
Instruction	1,287 11
	$37,227 94

A comparison of these figures with the estimates for 1890, will show that there is an over expenditure as follows: Farm proper, $1,519.60; Experimental Plots and Feeding, $285.20; and Garden, Lawn, etc., $1.87—making a total over-expenditure of $1,806.67; but, against this, there are unexpended balances—College, $2,213.97; Experimental Dairy, $1,079.87; and Instruction, $112.89. Hence, when all is added together, the total maintenance expenditure for the year is $1,600.06 less than the sum voted by the Legislature for that purpose.

VI.—COLLEGE IN ACCOUNT WITH FARM AND GARDEN.

(*a*) *With Farm.*

To 567 bushels of potatoes, at 40c	$226 80
" 4,248 gallons milk, at 12c	509 76
" cartage for College	30 00
" feed for College horse (without attendance)	75 00
" feed for Bursar's horse (without attendance)	75 00
" carpenter work by students, etc	15 00
	$931 56

(*b*) *With Garden.*

To fruit and vegetables (for items and prices, see Mr. Forsyth's Report, Part V.)	591 91
Total	$1,523 47

By amount paid by College for student labor on Farm and Garden (mostly on farm)	$3,027 34	
" half of farm superintendent's salary	1,000 00	
		4,027 34
" balance to credit of College		$2,503 87

Buildings Needed.

In conclusion, I may say that we still require four or five additional buildings to put us in a position to do satisfactorily and efficiently the work which we have undertaken. Those which are most urgently needed are :—

(1) A building to be used as a Convocation Hall and Gymnasium.
(2) New green and propagating houses.
(3) A house for the Professor of Chemistry.
(4) A house for the Professor of Natural History.

Hoping that you may find it possible to erect some of these buildings before the close of the year 1891,

I have the honor to be, sir,

Your obedient servant,

JAMES MILLS,
President.

PART II.

REPORT OF THE

PROFESSOR OF NATURAL HISTORY AND GEOLOGY.

ONTARIO AGRICULTURAL COLLEGE.
GUELPH, December 31st, 1890.

To the President of the Ontario Agricultural College:

SIR,—In submitting to you a report of the department of Natural History, it will be convenient to consider it under the following topics:—

1. Museum.
2. Library.
3. Reading-room.
4. Practical work.

1. COLLEGE MUSEUM.

During this year some improvements have been effected in our museum.

A collection of weeds has been made, which forms an attractive centre to many visitors. It contains sixty-five full sized specimens, representing twenty-three orders, fifty-seven genera and sixty-five species.

These typical plants are not pressed, but put in the case and allowed to dry. Root, stem, leaf, flower and seed are secured as far as possible so that the collection may be interesting, attractive and instructive. Each plant is labelled with the common and scientific name by which it is known. A large card in each division bears the name of the family or order. Many of the plants retain their form well and present characters by which they may be readily known.

In connection with this we are endeavoring to secure a collection of weed seeds. These will be placed along with the plants, so that the thoughtful student will be enabled to identify the seeds of injurious plants as well as the plants that bear them. The following is the results of our work this season:—

ORDER I.

Ranunculaceæ (Crowfoot Family).

Ranunculus Sceleratus	Cursed Crowfoot.
Aconitum Napellus	Monkshood.

ORDER II.

Cruciferæ (*Mustard F*).

Lepidium Virginicum	Pepperwort.
Sinapis arvensis	Common Mustard.
Capsella Bursa-pastoris	Shepherd's Purse.
Thlaspi arvense	Penny Cress.
Camelina sativa	False Flax.

ORDER III.

Caryophyllaceæ (*Pink F*).

Lychnis vespertina	White Cockle.
Silene inflata	Bladder Campion.
Lychnis Githago	Cockle.
Stellaria media	Chickweed.

ORDER IV.

Portulacaceæ (*Purslane F*).

Portulaca oleracea	Purslane.

ORDER V.

Malvaceæ (*Mallow F*).

Malva rotundifolia	Mallow.
Malva moschata	Musk Mallow.

ORDER VI.

Leguminosæ (*Pulse F*).

Vicia cracca	Wild Tare.
Melilotus officinalis	Yellow Melilot.
" alba	White "

ORDER VII.

Onagraceæ (*Evening Primrose F*).

Oenothera biennis	Evening Primrose
Epilobium angustifolium	Willow-herb.

ORDER VIII.

Anacardiaceæ (*Cashew F*).

Rhus venenata	Poison Sumach.

ORDER IX.

Dipsaceæ (Teasel F).

Dipsacus sylvestris	Wild Teasel.

ORDER X.

Compositæ (Composite F).

Senecio vulgaris	Groundsel.
Ambrosia artemisiæfolia	Ragweed.
Maruta Cotula	May-weed.
Sonchus oleraceus	Sow-thistle.
Erechthites hieracifolia	Fire-weed.
Arctium Lappa	Burdock.
Cichorium Intybus	Chicory.
Rudbeckia hirta	Cone-flower.
Leucanthemum vulgare	Ox-eye Daisy.
Taraxacum officinale	Dandelion.
Achillæa Millefolium	Yarrow.
Tanacetum vulgare	Tansy.
Solidago Canadensis	Goldenrod.
Erigeron Philadelphicum	Fleabane.
Cnicus arvensis	Common Thistle.
Cnicus lanceolatus	Bull Thistle.

ORDER XI.

Plantaginaceæ (Plantain F).

Plantago major	Common Plantain.
P. lanceolata	Ribgrass.

ORDER XII.

Scrophulariaceæ (Figwort F).

Verbascum Thapsus	Mullein.
Veronica peregrina	Neckweed.
Linaria vulgaris	Toadflax.

ORDER XIII.

Verbenaceæ (Vervian F).

Verbena hastata	Vervian.

ORDER XIV.

Labiatæ (Mint F.)

Nepeta Cataria	Catnip.
Leonurus Cardiaca	Motherwort.

ORDER XV.

Borraginaceæ (Borage F).

Cynoglossum officinale	Hounds-tongue.
Echium vulgare	Blue-weed.
Echinospermum Lappula	Stickseed.
Lithospermum arvense	Pigeon-weed.

ORDER XVI.

Convolvulaceæ (Convolvulus F).

Convolvulus arvensis	Bind-weed.

ORDER XVII.

Solanaceæ (Nightshade F).

Datura Stramonium	Thorn Apple.

ORDER XVIII.

Asclepiadaceæ (Milkweed F).

Asclepias cornuti	Milkweed.

ORDER XIX.

Euphorbiaceæ (Spurge F).

Euphorbia Cyparissias	Yellow Spurge.

ORDER XX.

Chenopodiaceæ (Goosefoot F).

Chenopodium album	Lamb's-quarters.
C. capitatum	Strawberry Blite.

ORDER XXI.

Polygonaceæ (Buchwheat F).

Rumex crispus	Dock.
Polygonum aviculare	Doorweed.
Rumex acetosella	Field Sorrel.

ORDER XXII.

Amarantaceæ (Amaranth F).

Amarantus retroflexus	Pigweed.

ORDER XXIII.

Gramineæ (*Grass F*).

Avena fatua	Wild Oat.
Bromus secalinus	Chess.
Setaria glauca	Foxtail.
Agropyrum repens	Couch-grass.
Panicum crus-galli	Barnyard-grass.
P. capillare	Old-Witch Grass.

We have also added to our collection of insectivorous birds, and hope by the end of another year to have a complete list that will represent birds which are beneficial to the farmer and the fruit-grower.

During 1890 we have received a few donations to the museum, for which we express thanks to the donors, and hope that they and others will remember we are always ready to receive any specimens that will aid us in teaching.

The following is a list of the contributors:—Miss Vail, Guelph, peculiar growths upon stems; Nelson Monteith, B.S.A., crow's nest; Wm. Shaw, Agrl. College, nest and eggs of the cedar bird; Mrs. Barnett, Niagara Falls south, a Bolivian dress; J. B. Bealey, student, wasp's nest; Jacob Stroh, Waterloo, marl from banks of Grand River; J. Hoyes Panton, Agrl. College, eggs of salmon and white fish, specimens of newly hatched fish; specimens from Mammoth Cave, Ky., Wyandot Cave, Ind., and Yellowstone Park illustrating facts in geology.

LIBRARY.

Several useful books have been added this year and our list is gradually embracing a most valuable collection of books for students reading along the lines of agricultural science. A special catalogue has been prepared for the use of students. This contains the names of 800 books, which are the best suited for the present use of students. Experience has taught the Librarian, that our students, especially those of the first year, are at a loss to know what books to select from the 5,600 upon the shelves. By making a special catalogue of 800 of the most important, the number becomes limited and very little mistake is made, if any one is selected.

Our Library now contains 5,690 volumes, of which 207 have been added this year. The books added may be grouped as follows:—

Reports, chiefly agricultural	80
Botany	7
Geology	1
Agriculture	22
Chemistry	14
Literature	19
Encyclopædias	9
General Science	3
Parliamentary reports	15
Examination papers, bound	1
Biography	8
History	23
Horticulture	5
	207

3. READING-ROOM.

This is one of the most commodious and pleasant rooms in the College, and is becoming yearly more used for the purpose it was intended. It is well furnished for reading and study ; excellent tables and chairs, and convenient reading desks, upon which are found the best agricultural journals published, a list of which is given below.

The following is a list of papers, journals and magazines which come to the College, and are for the use of the students in attendance :—

PAPERS AND MAGAZINES.

(a) *Sent free by the Publishers.*

Name.	Where published.
1. Journal of Commerce	Montreal.
2. Canadian Baptist	Toronto
3. Christian Guardian	“
4. Canada Presbyterian	“
5. Monthly Weather Review	“
6. Presbyterian Review	“
7. Sheep Breeder and Wool Grower	Chicago.
8. Manitoba Weekly Free Press	Winnipeg.
9. Canadian Horticulturist	St. Catharines.
10. Canadian Entomoloist	London, Ont.
11. Bee Journal	Beeton.
12. North York Reformer	Newmarket.
13. Acton Free Press	Acton.
14. Ontario Evangelist	Erin, Ont.
15. Evangelical Churchman	Toronto.
16. Montreal Witness	Montreal.
17. Farmers' Review	Chicago.
18. Welland Tribune	Welland.
19. Paris Transcript	Paris.
20. Canadian Independent	Toronto.

(b) *Furnished by the College.*

Name.	Where Published.
1. Daily Globe	Toronto.
2. “ Mail	“
3. “ Empire	“
4. “ Mercury	Guelph.
5. “ Herald	“
6. Rural Canadian	Toronto.
7. Grip	“
8. Poultry Review	“
9. Farmers' Advocate	London, Ont.
10. Canadian Stock Raisers' Journal	Toronto.
11. Nor'-West Farmer	Winnipeg.
12. Breeders' Gazette	Chicago.
13. North British Agriculturist	Edinburgh (Scotland).
14. Farmers' Gazette	Dublin (Ireland).
15. Mark Lane Express	London (England).
16. American Garden	Greenfield (Mass).
17. American Naturalist	Philadelphia.
18. Veterinary Journal	London (England).
19 Veterinarian	“

Name.	Where published.
20. Cultivator and Country Gentleman	Albany, N.Y.
21. Scientific American	New York.
22. Live Stock Journal	England.
23. Live Stock Journal	Chicago.
24. American Dairyman	New York.
25. Botanical Gazette	Crawfordsville, Indiana
26. Agricultural Science	Geneva, N.Y.
27. Canadian Honey Producer	Brantford.
28. Literary Digest	Boston.
29. Entomological News	Philadelphia.
30. Canadian Agricultural and Home Magazine	Peterboro.
31. Hoard's Dairyman	Ft. Atkinson, Wis.
32. Maritime Agriculturist	New Brunswick.

4.—PRACTICAL WORK.

In the department of Natural History much has been done to make the study of science popular and practical. For use in the third year we have now some ninety-five drawings illustrating microscopic plants injurious to garden, orchard and field crops.

These are also drawn upon slides for the magic lantern, and can be used for instructive purposes.

On the canvas rust, blight, mildews, etc., appear like plants 4–7 feet in height. The diagrams and slides are arranged in the same order as the subjects are treated in the lecture-room.

This affords great aid to students and impresses lessons, which might soon be forgotten. We are constantly preparing slides for this purpose so that science will be illustrated on board, paper and canvas, and so presented as to be attractive, popular and instructive. In all we have upwards of 300 slides for the stereopticon, illustrating facts in Zoology, Botany and Geology.

In the spring of this year much time was occupied in completing the bed of plants used in connection with lectures in botany. This botanical instructive bed has become an important adjunct of the work in the class-room.

It is 224 feet in length and 15 feet in width. The rows containing the plants are 13 feet long, and a certain number of rows are set apart to illustrate typical plants in each order according as the order is large or small. Some orders have six rows, others only one, consequently a student knows at once whether the order is a common one or not by the number of plants set apart to illustrate it. In the Compositæ he sees 30, Ranunculacæ, 20, Papaveraceæ, 1, etc.

In the whole bed we have 40 orders, 275 genera and 550 species, which are arranged as follows:—

1. A systematic arrangement embracing 40 orders, 225 genera, 325 species.
2. A promiscuous arrangement embracing 225 species not grouped in orders. This is to test the student's knowledge of the orders to which the various plants belong.
3. An arrangement to illustrate the various methods of arranging plants in beds, such as carpet, mass, ribbon, and miscellaneous bedding.

Every plant is labelled so that students and visitors can readily identify them. In front of the first plant in each order the name of the order is indicated upon a large label. The divisions, polypetalous, gamopetalous and epetalous are also shown by larger labels The following is a list of the plants found in the first bed, illustrating the systematic arrangement of the flowers into orders as discoursed in the class-room :—

To James Goldie, Esq., of Guelph, we are much indebted for many of the plants that have enabled me to fill up what certainly would have been blanks, were it not for his generosity. Few men, if any, possess a garden with as many species as he, and we are very fortunate to be so near him, and have always found him ready to aid us along the line of horticultural work.

ORDER I.

Polypetalous Exogens.

Ranunculaceæ (*Crowfoot Family.*)

Row 1—

1	Hepatica acutiloba	Liver-leaf.
2	H. triloba	Lobed "
3	Anemone pulsatilla	Pasque-flower.
4	A. nemorosa	Wood Anemomy.
5	Ranunculus acris	Buttercup.

Row 2—

1	Adonis vernalis	Spring Adonis.
2	Coptis trifoli	Goldthread.
3	Aconitum Napellus	Monkshood.
4	Pæonia tenuifolia	Cut-leaved Pæony.
5	P. officinalis	Pæony.

Row 3—

1	Aquilegia Canadensis	Columbine.
2	Thalictrium dioicium	Meadow Rue.
3	" speciosum	
4	Aquilegia cærulea	Cærulean Columbine.
5	Delphinium splendens	Larkspur.

Row 4—

1	Clematis viorna	Clematis.
2	C. corymbosa	"
3	Helleborus-viridis	Hellebore.
4	Eranthis hyemalis	Winter Aconite.
5	Nigella Damascena	Love-in-the-mist.

ORDER II.

Berberidaceæ (*Barberry F.*).

Row 5—

1	Epimedium Alpinum	Epimedium.
2	Caulophyllum thalictroides	Blue Cohosh.
3	Podophyllum peltatum	Mandrake.
4	Epimedium	
5	Berberis purpurea	Purple Barberry.

ORDER III.

Papaveraceæ (*Poppy Family*).

Row 6—

1	Sanguinaria Canadensis	Blood-root.
2	Papaver Orientalis	Poppy.
3	Chelidonium majus	Celandine.
4	Glaucum luteum	Horn Poppy.
5	Bocconia cordata	Bocconia.

ORDER IV.

Fumariaceæ (*Fumitory F.*).

Row 7—

1	Dicentra Canadensis	Squirrel-corn.
2	" Cucullaria	Deer-fly.
3	" spectabilis	Bleeding-heart.
4	Adlumia cirrhosa	Climbing Fumitory.
5	Corydalis aurea	Golden corydalis.

ORDER V.

Cruciferæ (*Cress F.*).

Row 8—

1	Iberis umbellata	Candytuft.
2	Brassica napus	Turnip.
3	Lepidium Virginicum	Pepperwort.
4	Arabis	Rock-cress.
5	Sinapis arvensis	Wild Mustard.

Row 9—

1	Sisymbrium officinale	Hedge Mustard.
2	Dentaria diphylla	Toothwort.
3	Lunaria biennis	Honesty.
4	Camelina sativa	False flax.
5	Sinapis alba	White Mustard.

Row 10—

1	Alyssum maritinum	Sweet Alyssum.
2	Brassica oleracea	Cabbage.
3	Capsella Bursa pastoris	Shepherd's-purse.
4	Rhaphanus sativus	Radish.
5	Matthiola annua	Stock.

ORDER VI.

Violaceæ (*Violet F.*.)

Row 11—

1	Viola pubescens	Yellow Violet.
2	" blanda	White "
3	" Canadensis	Canadian "
4	" culcullata	Common Blue Violet.
5	" tricolor	Pansy.

ORDER VII.

Caryophyllaceæ (*Pink F.*).

Row 12—

1	Cerastium arvense	F. Mouse-ear Chickweed.
2	Tunica saxifraga	Tunica.
3	Dianthus deltoides	Deltoid Pink.
4	Lychnis vespertina	White Cockle.
5	Dianthus barbatus	Sweet William.

Row 13—

1	Cerastium vulgatum	Mouse-ear Chickweed.
2	Saponaria officinalis	Bouncing Bet.
3	Silene inflata	Bladder Campion.
4	Lychnis Githago	Cockle.
5	Dianthus Chinensis	China Pink.

Row 14—

1	Arenaria serpyllifolia	Thyme-lea'd Sandwort.
2	Saponaria Caucasia	Soapwort.
3	Spergula arvensis	Spurrey.
4	Stellaria media	Chickweed.
4	Lychnis diurna	Red Lychnis.

ORDER VIII.

Portulacaceæ (*Purslane F.*).

Row 15—

1	Claytonia Virginica	Spring Beauty.
2	Portulaca grandiflora	Portulaca.
3	" oleracea	Purslane.
4	" grandiflora	Portulaca.
5	Calandrina discolor	Calandrina.

ORDER IX.

Malvaceæ (*Mallow F.*).

Row 16—

1	Malva rotundifolia	Mallow.
2	Abutilion striatum	Indian Mallow.
3	Malope trifida	Malope.
4	Malva moschata	Musk Mallow.
5	Althaea rosea	Hollyhock.

ORDER X.

Linaceæ (*Flax F.*)

Row 17—

1	Linum flavum	Yellow Flax.
2	" grandiflorum	Red "
3	" usitatissimum	Common "
4	" perenne	Perrenial "
5	" usitatissimum	Common "

ORDER XI.

Geraniaceæ (*Geranium F.*).

Row 18—

1	Geranium sanguineum	Crimson Geranium.
2	Impatiens balsamina	Balsam
3	Oxalis versicolor	Sorrel.
4	Tropaeolum majus	Nasturtium.
5	Pelargonium cordatum	Pelargonium.

Row 19—

1	Tropaeolum majus	Nasturtium.
2	Geranium	Bronze Geranium.
3	"	Silver "
4	" Robertianum	Herb Robert.
5	" maculatum	Wild Geranium.

ORDER XII.

Leguminosœ (*Pulse F.*)

Row 20—

1	Lotus corniculatus	Bird's-foot Trefoil.
2	Vicia cracca	Wild Tare.
3	Pisum sativum	Pea.
4	Trifolium rubens	Crimson Clover.
5	Baptisia tinctoria	Wild False Indigo.

Row 21—

1	Medicago lupulina	Black Medick.
2	Trifolium arvense	Rabbit-foot Clover.
3	Medicago sativa	Lucerne.
4	Onobrychus sativa	Sainfoin.
5	Melilotus officinalis	Sweet Clover.

Row 22—

1	Trifolium repens	White Clover.
2	Trifolium pratense	Red "
3	Lathyrus latifolius	Everlasting Pea.
4	Vicia sativa	Tare.
5	Lupinus perennis	Lupine.

ORDER XIII.

Rosaceœ (*Rose F.*).

Row 23—

1	Waldsteinia fragaroides	Barren Strawberry.
2	Fragaria vesca	Wild "
3	Geum uniflorum	Avens.
4	Spiraea	Spiraea.
5	Rosa rugosa	Single Rose.

Row 24—

1	Potentilla argentea	Cinquefoil.
2	" verna	Green Cinquefoil.
3	" sulphurea	Yellow "
4	Spiraea	Spiraea.
5	Rubus strigosus	Raspberry.

ORDER XIV.

Saxitragaceœ (*Saxifrage F.*).

Row 25—

1	Saxifraga	Saxifrage
2	Mitella diphylla	Bishop's Cap.
3	Tiarella cordifolia	False Mitrewort.
4	Hydrangea hortensia	Hydrangea.
5	Ribes rubrum	Red Currant.

ORDER XV.

Crassulaceæ (*Orpine F.*).

Row 26—

1	Sedum acre	Stone-crop.
2	Sedum Telephinum	Live-forever.
3	Sempervivum tectorum	House-leek.
4	Sedum ternatum	
5	Sedum Sieboldii	

ORDER XVI.

Onagraceæ (*Evening-primrose F.*)

Row 27—

1	Circaea lutetiana	Enchanter's Nightshade.
2	Fuchsia	Fuchsia.
3	Clarkia pulchella	Clarkia.
4	Oenothera biennis	Evening Primrose.
5	Epilobium angustifolium	Willow-herb.

ORDER XVII.

Umbelliferæ (*Parsley F.*)

Row 28—

1	Carum petroselinum	Parsley.
2	Apium graveolens	Celery.
3	Daucus carota	Carrot.
4	Pastinaca sativa	Parsnip.
5	Eryngium amethystinum	Eryngo.

ORDER XVIII.

Cucurbtaceæ (*Gowad F.*)

Row 29—

1	Cucurbita verrucosa	Vegetable marrow.
2	Cucumis melo	Musk-melon.
3	Cucumis melo	Cucumber.
4	Citrullus vulgaris	Water-melon.
5	Cucurbito pepo	Pumpkin.

ORDER XIX.

GAMOPETALOUS EXOGENS.

Compositæ (*Composite F.*)

Row 30—

1	Achillæa Millefolium	Yarrow.
2	Gaillardia grandiflora	Gaillardia.
3	Coreopsis	
4	Achillæa filipendula	Golden Yarrow.
5	Ambrosia artemisæfolia	Ragweed.

Row 31—

1	Taraxacum officinale	Dandelion.
2	Senecio vulgaris	Groundsel.
3	Cineraria maritima	Cineraria.
4	Maruta cotula	Mayweed.
5	Pyrethrum roseum	Pink Feverfew.

Row 32—

1	Centaurea Cyanus	Bluebottle.
2	Tanacetum vulgare	Tansy.
3	Rudbeckia hirta	Cone-flower.
4	Anthemus tinctoria	Yellow Chamomile.
5	Solidago Canadensis	Goldenrod.

Row 33—

1	Bellis perennis	Daisy.
2	Leucanthemum vulgare	Ox-eye Daisy.
3	Arctium Lappa	Burdock.
4	Erigeron Philadelphicum	Fleabone.
5	Helianthus annuus	Sunflower.

Row 34—

1	Cirsium arvense	Thistle.
2	Hieracium auranticum	Hawkweed.
3	Echinops sphaerocephalus	Bee-plant.
4	Circium lanceolatum	Bull Thistle.
5	Chicorium Intybus	Chicory.

Row 35—

1	Sonchus oleraceus	Sow-thistle.
2	Gazania splendens	Gazania.
3	Gnaphalium polycephalum	Everlasting.
4	Dahlia variabilis	Dahlia.
5	Inula Helenium	Elecampane.

ORDER XX.

Lobeliaceæ (*Lobelia F.*)

Row 36—

1	Lobelia speciosa	Lobelia.
2	" "	"
3	" inflata	Indian Tobacco.
4	" syphilitica	Great Blue Lobelia.
5	" Cardinalis	Cardinal Flower.

ORDER XXI.

Campanulanceæ (*Campanula F.*).

Row 37—

1	Campanula Carpathica	Low Harebell.
2	" Americana	Tall Wild bell.
3	" medium	Cantebury Bell.
4	" latifolia	
5	" rotundifolia	Harebell.

ORDER XXII.

Plantaginanceæ (*Plantain F.*).

Row 38—

1	Plantago major	Plantain.
2	" lanceolata	Ribgrass.
3	" lanceolata	Ribgrass.
4	" "	"
5	" media	"

ORDER XXIII.

Primulaceæ (*Primrose F.*).

Row 39—

1	Primula veris	Cowslip.
2	" Sieboldi	
3	"	
4	Dodecatheon Meadia	Shooting-star.
5	Lysimachia vulgaris	Loose-strife.

ORDER XXIV.

Scrophulariaceæ (*Figwort F.*).

Row 40—

1	Veronica peregrina	Neckweed.
2	Linaria purpurea	Purple toadflax.
3	Mimulus ringens	Monkey-flower.
4	Penstemon pubescens	Penstemon.
5	Chelone glabra	Turtle-head.

Row 41—

1	Pedicularis Canadensis	Wood Betony.
2	Linaria vulgaris	Toadflax.
3	Antirrhinum majus	Snapdragon.
4	Digitalis purpurea	Foxglove.
5	Verbascum Thapsus	Mullein.

ORDER XXV.

Verbenaceæ (*Vervian F.*).

Row 42—

1	Verbena venosa	Verbena.
2	" "	"
3	Lantana camara	Lantana.
4	Phryma leptostachya	Lopseed.
5	Verbena hastata	Vervian.

ORDER XXVI.

Labiatœ (*Mint F.*).

Row 43—

1	Marrubum vulgare	Horehound.
2	Perilla Nankinensis	Perilla.
3	Coleus Veitchii	Foliage Plant.
4	Salvia officinalis	Sage.
5	Lavandula vera	Lavander.

Row 44—

1	Thymus variegata	Thyme.
2	Mentha viridis	Spearmint.
3	Leonurus Cardiaca	Motherwort.
4	Nepeta Cataria	Catnip.
5	Monarda fistulosa	Wild Bergamont.

ORDER XXVII.

Borragniaceœ (*Borage F.*).

Row 45—

1	Myosotis palustris	Forget-me-not.
2	Cynoglossum officinalis	Burr.
3	Echinospermum Lappula	Stickseed.
4	Echium vulgare	Blueweed.
5	Symphytum officinalis	Comfrey.

Row 46—

1	Lithospernum arvense	Redroot.
2	Heliotropium Peruvianum	Heliotrope.
3	Borage officinalis	Borage.
4	Anchusa officinalis	Anchusa.
5	Lithospermum Arvense	Pigeonweed.

ORDER XXVIII.

Polemoniaceœ (*Phlox F.*).

Row 47—

1	Phlox subulata	Low Phlox.
2	“ “	“
3	“ divarieata	Wild “
4	Gilia tricolor	Gilia.
5	Polemnonium caeruleum	Jacob's Ladder

ORDER XXIX.

Convolvulaceœ (*Convolvulus F.*).

Row 48—

1	Convolvulus arvensis	Bindweed.
2	Ipomaea purpurea	Morning-glory
3	C. arvensis	
4	I. purpurea	
5	“ “	

ORDER XXX.

Solanaceæ (Nightshade F.)

Row 49—

1	Petunia nyctaginfolia	Petunia.
2	Datura fastuosa	Datura.
3	Nicotiana rustica	Tobacco.
4	Lycopersicum esculentum	Tomato.
5	Solanum tuberosum	Potato.

ORDER XXXI.

Asclepiadaceæ (Milkweed F.)

Row 50—

1	Asclepias tuberosa	Butterfly-weed
2		
3	A. Cornuti	Milkweed.
4	A. incarnata	Swamp Milkweed.

ORDER XXXII.

APETALOUS EXOGENS.

Chenopodiaceæ (Goosefoot F.)

Row 51—

1	Blitum capitatum	Strawberry Blite.
2	Spinosa oleracea	Spinage.
3	Atriplex rubra	Atriplex.
4	Beta Vulgaris	Beet.
5	Chenopodium album	Lamb's-quarters.

ORDER XXXIII.

Amarantaceæ (Aramanth F.)

Row 52—

1	Achyranthes	Achyranthes.
2	Gomphrema globosa	Everlasting.
3	Celosia cristata	Cockscomb.
4	Iresine Lindeni	Iresine.
5	Amarantus retroflexus	Pigweed.

ORDER XXXIV.

Polygonaceæ (Buckwheat F.)

Row 53—

1	Polygonum aviculare	Doorweed.
2	Rumex acetosella	Sorrel.
3	Fagoyprrum esculentum	Buckwheat.
4	Rumex crispus	Dock.
5	Rheum Rhaponticum	Rhubarb.

ORDER XXXV.

Euphorbiaceæ (*Spurge F.*)

Row 54—

1	Euphorbia maculata	Spotted spurge.
2	“ hypericifolia	
3	“ Cyparissias	Cypress spurge.
4		
5	Ricinus communis	Castor-oil Plant.

ORDER XXXVI.

ENDOGENS.

Araceae (*Arum F.*)

Row 55—

1.	Arisaema triphyllum	Indian Turnip.
2.	Symplocarpus foetidus	Skunk Cabbage.
3.	Acorus Calamus	Calamus.
4.		
5.	Calla Ethiopica	Calla Lily.

ORDER XXXVII.

Iridaceae (*Iris F.*)

Row 56—

1.	Crocus vernus	Spring Crocus.
2.	Gladiolus cardinalis	Gladiolus.
3.	Paradanthus Chinensis	Blackberry Lily.
4.	Sisyrinchium Bermudiana	Blue-eyed Grass.
5.	Iris versicolor	Common Flag.

Row 57—

1.	Iris arenaria	Flag.
2.	“ Sibirica	“
3.	“ Germanica	“
4.	“ fimbriata	“
5.	“ Persica	“

ORDER XXXVIII.

Lilaceae (*Lily F.*)

Row 58—

1.	Convallaria majalis	Lily-of-the-Valley.
2.	Tulipa Gesneriana	Tulip.
3.	Scilla rosea	Scilla.
4.	Uvularia grandiflora	Bellwort.
5.	Yucca filamentosa	Yucca.

Row 59—

1.	Erythronium Americanum	Dog-tooth Violet.
2.	Polygonatum	Solomon's-seal.
3.	Funkia variegata	Funkia.
4.	Allium stellatum	Star Onion,
5.	Lillium tigrinum	Tiger Lily.

Row 60—

1	Allium tricoccum	Leek.
2	Hyacinthus Orientalis	Hyacinth.
3	Trillium grandiflorum	Trillium.
4	Fritillaria	Fritillaria.
5	Lilium	Orange Lily.

ORDER XXXIX.

Amaryllidaceæ (*Amaryllis F.*).

Row 61—

1	Galanthus nivalis	Snowdrop.
2	Narcissus pseudo-narcissus	Daffodil.
3	Narcissus poeticus	Narcissus.
4	Polianthes tuberosa	Tuberose.
5	Agave Americana	American Aloe.

ORDER XL.

Gramineæ (*Grass F.*).

Row 62—

1	Festuca ovina	Sheep's Fescue.
2	T. pratensis	Meadow “
3		
4	Dactylis glomerata	Orchard-grass.
5	Triticum repens	Couch-grass.

Row 63—

1	Poa pratensis	Kentucky Blue-grass.
2	P. Compressa	Wire-grass.
3	Phleum pratense	Timothy.
4	Alopecrus pratensis	Meadow Foxtail.
5	Setaria glanca	Com. Foxtail.

Row 64—

1	Panicum Crus-galli	Barnyard-grass.
2	Arrenatherum avenaceum	Tall Oat-grass.
3	Lolium perenne	Perennial Rye.
4	Bromus secalinus	Chess.
5	Avena fatua	Wild Oat.

Row 65—

1	Phalaris arundinacea	Ribbon-grass.
2	Hordeum vulgare	Barley.
3	Triticum vulgare	Wheat.
4	Avena sativa	Oat.
5	Zea Mays	Indian corn.

40 orders. 225 genera. 325 species.

Besides this collection we have undertaken to lay out a bed containing the most common wild flowers of Canada. A suitable place has been selected, and already many plants put in. This has been done with a view to familiarize our students with our wild flowers, many of which are very beautiful. Another, year will add much to the appearance of this practical bed of plants.

The following bulletins have been issued from the Natural History Department during 1890 :—

BULLETIN LII.—AGRICULTURAL COLLEGE.

Guelph, June 16, 1890.

Black-Knot on Plums.

In a late bulletin issued from the Bureau of Industries my attention was called to the fact that the black-knot upon plum-trees is very prevalent and appears to be spreading rapidly. This is easily accounted for when we understand the nature of the plant that causes it, and remember how little is done to check its progress by those upon whose trees it appears. The writer has on several occasions at Farmers' Institutes referred to this trouble and endeavored to show the necessity of united action being taken to extirpate it, or at least to some extent lessen its distribution. With a view to extend information regarding the cause and nature of this trouble to a large number of readers this Bulletin is written.

Life History of the Fungus.—An examination of the knot in its earliest stages shows innumerable small, transparent threads, only seen by aid of the microscope. They branch among the cells which compose the tissue of the inner bark of the tree, and form the so-called *mycelium* or vegetable part of the fungus. The threads become very intricately twisted together in bundles as development proceeds, beginning in the growing layer of the bark and radiating outwards. As spring advances, the threads increase and reach a more matured condition. As growth proceeds, the knot assumes a velvety appearance ; this is the result of the threadlike structures sending off many short-jointed filaments, on the ends of which are borne egg-shaped spores known as *conidiospores.* These are very small, requiring the aid of a microscope to see them. When ripe, they are readily disturbed, may be blown by the wind and thus reach new starting points so as to give rise to knots similar to that upon which they were developed. This mode of reproduction in the "knot" continues till the summer is well advanced, when another class of spores begins to develop, and which reach maturity about February. The surface of the knot during winter shows spores that can be seen by the naked eye ; these open into cavities, on the walls of which are two kinds of structures, one consisting of slender filaments (*paraphyses*) the use of which is not known ; the other club-shaped (*asci*). In the *asci* towards the close of winter *ascospores* are developed, usually eight in each *ascus*, out of which the spores come through an opening at the end ; these spores become new starting points for the parisitic plant, when they reach proper conditions for development. Other cavities also are found among those with the *asci* ; these contain very minute oval spores divided by cross partitions into three parts, and borne on slender stalks. These are called *stylospores*, the use of which is not known, but they are generally believed to be concerned in the perpetuation of the species. Still other cavities exist containing slender filaments (*spermatia*) which also seem to be concerned in reproduction. Besides the cavities referred to, sometimes spaces more flattened than these, and in some cases showing a triangular form, appear ; they are lined with short, delicate filaments that end in a minute oval body. These bodies are produced in great numbers and are discharged in masses, being held together by a sort of jelly. They have been called *Pycnidiospores*, and also seem to be connected with the perpetuation of the fungus.

Reproductive Organs.—In the case of this parasitic plant we have then five kinds of reproductive organs, viz. : conidiospores, ascospores, stylospores, spermatia and pycnidiospores, all more or less connected with the spread of the fungus. Until the true nature of this fungus became known it was generally believed that the "knots" were caused by insects, but since the life history of the plant has been made out the insect theory has been abandoned. The following objections may be made against it : (1) The knots do not resemble galls made by insects. (2) Insects may be found in old knots, but seldom, if ever, in young. (3) The insects are of various species, some of which are found on trees where knots never occur. (4) Wherever the knot is found the fungus described invariably is present, and is never seen, but associated with the knot and can be observed in the stem before anything like a knot is visible.

REMEDIES.

1. Hitherto most orchardists have found the best thing to do is to cut off affected limbs and destroy them. Where a tree is badly attacked, destroy the whole tree.
2. Some experiments in applying linseed oil to the knots with a small brush so as to saturate the knot have been effective. This is done three or four times during the summer, as soon as the knots appear.
3. Coal oil may be used, but it must be applied carefully. If it runs over the branch it will kill it.
4. Wild choke-cherry trees near orchards should be destroyed. It is unfortunate that so little regard is paid to the law which requires affected trees to be destroyed. These trees are scattering millions of spores yearly, and thus spreading the disease to all parts of the Province. Blighted trees stand as monuments of the indifference and ignorance of those who should co-operate in fighting against a common foe.

BULLETIN LVI.—AGRICULTURAL COLLEGE.

Guelph, December 9, 1890.

Smut: Its Habits and Remedies.

Smut is a disease well known to farmers, and though good remedies have been found to prevent it, yet there are many ignorant of them if we judge from the number of questions sent to the College on the subject. As there are several varieties of smut, we shall consider the habits of some of the most common, and then give some remedies.

Tilletia caries (*Bunt or Stinking Smut*).—When wheat is affected by this variety the grains are shorter and more swollen than usual, and present a greenish-drab color. Sometimes they are cracked. These affected grains are completely filled with minute round black spores, having an unpleasant smell, and presenting under the microscope a somewhat roughened appearance. They are much larger than the spores of the common smut. When they reach favorable conditions, heat and moisture, germination takes place, and a series of reproductive bodies result, which give rise to the vegetative portion of the fungus. This is an exceedingly slender jointed thread that ultimately bears perfect spores in the wheat plant after reaching the seed. These reproductive bodies, called sporidea or sporules, are produced outside of the wheat plant, but when they come in contact with the young host they find their way into its tissues, and running up the stem between the cells, they finally reach the seed, and bear spores on tiny stalks. It has been calculated that one grain may contain 40,000,000 spores, inclosed within the thin skin, and not exposed, as in the common smut of wheat and oats.

Ustilago Carbo (*Common or Loose Smut*).—In cases of attack from this form, the affected plants are readily observed, as it shows itself very distinctly by covering the ear with smut. The spores have no bad odor and are exceedingly minute, being much smaller than those of *Bunt*. When they reach favorable conditions, germination takes place, and reproductive structures result; these, as in *Bunt*, give rise to the vegetative portion of the fungus which reaches the young plant, and a course is followed, much the same as in *Bunt*. Investigation indicates that the trouble in plants attacked comes from the ground and travels upwards; that the results of the attack manifest themselves in the head, and especially in the grain; that seed, dusty from smut, results in much of the grain being smutty.

USTILAGO ZEÆ-MAYS (*Corn Smut*).—In this case the smut is not so local as in the preceding. The affected parts are not confined to the ear alone, but sometimes are found elsewhere. The spores form inside of the threads of the vegetative structure, and not upon little stalks, as in the other smut, and thus are widely different in development. When the spores germinate they give rise to a sort of tube-like structure in which several cross partitions are formed and the tube divides into cells. At the tip of these sporules form ; they germinate singly and produce structures that may penetrate the tissues of the corn plant at its most tender point (the lowest joint of the stem), when the plant is young. During the growing period of the fungus, up to the time when spore formation takes place, it consists only of that portion which necessarily begins its growth near the surface of the ground, since it enters when the corn is very young. As the plant increases the fungus grows upwards to the place where it forms spores. The fruiting time of the corn marks also the period when spores are developed, usually upon the young kernels. About this time the thread-like structures branch where spores are to be formed. The tips of the branching threads swell, and granules appear in the contents. These finally develop into spores imbedded in the substance within the threads ; the cell walls become gelatinous as spore formation proceeds, and this gives a slimy character to the mass of smut ; but in the course of time, further changes take place, and very little remains but dry, round, dusty spores. It is injurious to feed cattle with smutty corn, as it acts upon the animal economy much the same as ergot of rye. Passing through the animal system does not destroy the germinating power of smut, consequently the spores in manure are in a condition to spread the trouble. As it is readily seen on affected parts and may be picked off, it should be gathered and destroyed by fire or otherwise. It is not sufficient to pick off the smut and throw it upon the ground, as the spores will still continue to form.

REMEDIES.—With such facts before us we are in a position to suggest some remedies, which are applicable to the several varieties of smut :

1. Sow clean seed.
2. Steep seed five minutes in a solution of copper sulphate (1 lb. to 1 gallon of water) ; constantly stir so as to wet the grain evenly ; then spread it on a floor to dry, or add some land plaster or slacked lime, and mix until dry. One gallon is about enough for 4 bushels. Some prefer using a weaker solution and allowing a longer time : *e,g.*, 1 lb. copper sulphate to 4 gallons of water, and steep twenty-four hours.
3. 1 lb. caustic potash in 6 gallons of water ; let soak a day. Or take 40 lb. hardwood ashes to 10 gallons water ; let this stand a day, stirring from time to time, and the water poured off will be a solution about the same strength as the preceding.
4. Brine strong enough to float an egg does very well if the seed is kept in it for several hours with occasional stirring.
5. Immersing the grain in hot water (135° F.) for 5 minutes, or 132° F. for 15 minutes, destroys smut spores without injury to the grain. A temperature 5° above or below this fails in its results.

By keeping the seed in a sack made of coarse material it may be readily dipped into any of the solutions recommended.

In the department of Natural History we are constantly adding improvements so as to render the teaching of this subject attractive. We are now able to use the stereopticon in the class-room during the day. Hitherto we used it in the evening only, but we have had curtains put upon the windows so that the room can be darkened at any time.

We have under consideration now an arrangement by which we shall be able to use the lime-light instead of the ordinary oil lamp. This will enable us to throw upon the screen, objects in the microscope, without requiring to have specially prepared slides for the lantern. This will be a great step in advance, and at once place us in a position to use apparatus of great use in teaching botany and allied subjects. The expense will be about fifty dollars, and all the fixtures will be of use in a new laboratory when such is built. We think the time has arrived when a new greenhouse should be erected, and in connection with it a lecture-room, etc., for the use of the students in botany. Every department has had much money spent upon it except this, and we have patiently waited, hoping the time would soon come when the equipment of the botanical department would equal that of the chemical. Our institution should have it, in fact, there are some high schools able to boast of instruments we have not been able to get yet, owing to the want of suitable accommodation.

During the present year an additional orchard has been laid out. It was found that field 10 was poorly adapted for fruit-growing, and that the time had arrived to try another location. About six acres were selected in field 13, where the soil seems favorable and naturally well drained. The following trees, etc., have been planted :

APPLES.

Northern Spy, 12 ; Walbridge, 17 ; Fameuse, 10 ; Duchess of Oldenburg, 7 ; Yellow Bellflower, 7 ; Wealthy, 6 ; Golden Russet, 5 ; Wagener, 5 ; Yellow Transparent, 5 ; Magog Red Streak, 5 ; St. Lawrence, 5 ; Colvert, 5 ; Red Astrachan, 5 ; Ben Davis, 3 ; Ribston Pippin, 3 ; Alexander, 3 ; Bailey's Sweet, 2 ; Salome, 1 ; Aucubifolia, 1 ; Russian Apples, Nos. 60, 182, 270, 322, 599.

PEARS.

Ritson, 10 ; Beurre Hardy, 2 ; Beurre de Anjou, 2 ; Sheldon, 2 ; Flemish Beauty, 2 ; Clapp's Favorite, 2.

GRAPE VINES.

Worden, 30 ; Salem, 30 ; Moore's Early, 14 ; Delaware, 10 ; Lady, 10 ; Red Wyoming, 10 ; Early Victor, 5 ; Moyer, 5 ; Rogers No. 4, 5 ; Montgomery Red, 4 ; Agawam, 4 ; Concord, 3 ; Brighton, 3 ; Rogers No. 28, 2 ; Lindley, 2.

RASPBERRIES.

Cuthbert, 325 ; Philadelphia, 220 ; Marlboro, 120 ; Golden Queen, 50 : Hilborn, 50 ; Tyler, 50.

CURRANTS.

White Grape, 50 ; Fay's Prolific, 50 ; Cherry, 27 ; Champion, 24 ; Lee's Prolific, 50 ; Naples, 25 ; Saunder's Seedling, 45.

GOOSEBERRIES.

Downing, 75 ; Houghton, 50 ; Whitesmith, 45 ; Industry, 25 ; Smith's Improved, 25 ; Pearl, 25.

STRAWBERRIES.

Dominion, 500 ; Crescent Seedling, 500 ; Wilson's Albany, 230 ; Manchester, 150 ; Clouds, 150 ; Rubach, 130 ; Haverland, 50 ; Jessie, 60 ; Sharpless, 60.

About four acres on the east side of Field 4 has been laid out with forest trees, embracing the following kinds :—Ash, Maple, Hickory, Birch, Mountain Ash, American Chestnut, Walnut, Sycamore, Catalpa and Austrian Pine. This has been done with a view to learn something regarding the effect of cultivation upon trees of this class.

Our former vineyard in Field 17 has been reduced to about two acres, these containing none but the hardiest varieties. In the old vineyard we had some 96 varieties, but experience has taught us that only a limited number will ripen with us and these are retained. The others are destroyed, and that portion of the vineyard devoted to other crops.

Our clumps of Larch, Walnut and mixed collections are doing well. The hedge plants and trees grown in the nursery, situated in the corner of the Experimental Field, are also progressing favourably From these we are able to remove from time to time trees and shrubs to other parts where required.

METEOROLOGY.

Report of Observations taken at the Ontario Agricultural College during 1890.

Observations are regularly taken at the hours of 7 a.m., 1 p.m., and 9 p.m. daily, and recorded in a book printed for the purpose. The instruments in use are as follows :—

Anemometer—Recording the direction of the wind and indicating the number of miles travelled. During the greater part of '89 this has been out of order.

Barometer—Showing the atmospheric pressure at the time of observation.

Maxium thermometer—Indicating the highest temperature between times of observation.

Minimum thermometer—Indicating the lowest temperature between times of observation.

Hygrometer—With *dry* and *wet* bulb thermometer, for the purpose of showing the condition of the atmosphere with reference to moisture.

Pluviameter—Used in measuring the rainfall.

Thermometer—For observing ordinary temperature.

Besides taking observations from these instruments, the cloudiness of the sky is observed, and general remarks on the weather for the day are recorded in the daily register. At the close of each month a summary of the month's observations is made out. From these monthly summaries the condensed statement of the year's meteorology is made up.

Form of Monthly Summary.

Meteorology.

A summary of the meteorological observations taken at Ontario Agricultural College during the month of............

Normal height of barometer at Guelph (1,100 feet above sea level and 858 feet above Lake Ontario, 28.86 inches. Latitude north 43°-38′.

Barometer—

- Highest barometer.
- Lowest "
- Highest mean barometer.
- Lowest " "
- Monthly " "
- Monthly range.

Thermometer—

- Highest thermometer.
- Lowest "
- Highest mean thermometer.
- Lowest " "
- Monthly " "
- Monthly range.

Pluviameter—

- Days rain fell.
- Greatest rainfall.
- Days snow fell.
- Greatest snowfall.
- Total precipitation.

Anemometer—

- Direction of wind.
- Greatest number of miles travelled in twenty-four hours.
- Greatest velocity per hour.
- Mean velocity per month.

Summary of the Meteorological Results for 1890.

—	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Barometer—	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.	inches.
Highest barometer	29.474	29.342	29.270	29.294	29.038	29.140	29.958	29.910	29.192	29.128	29.600	29.960
Lowest barometer	28.116	28.213	28.134	28.054	28.362	28.600	28.600	28.400	28.622	28.126	28.100	28.218
Highest mean barometer	29.415	29.260	29.186	29.260	28.955	29.124	29.256	29.151	29.192	29.100	29.341	29.276
Lowest mean barometer	28.426	28.408	28.154	28.175	28.520	28.610	28.672	28.615	28.706	28.176	28.545	28.275
Monthly mean barometer	28.938	28.056	28.779	28.101	28.273	28.844	28.882	28.896	28.944	28.514	28.943	28.783
Monthly range	1.358	1.129	1.136	1.240	.676	.540	1.358	1.470	.570	1.002	1.600	1.742
Thermometer.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.	degrees.
Highest temperature	65.0	3.7	5.2	74.0	75.5	89.9	....	104.3	89.3	75.8	71.2	55.5
Lowest temperature	10.0	.5	.9	19.0	25.0	35.6	43.5	39.4	30.0	26.0	20.5	-4.0
Highest mean temperature	43.0	35.5	31.1	....	63.3	75.3	75.6	75.7	71.6	60.4	47.9	31.7
Lowest mean temperature	11.3	11.9	11.1	....	39.7	51.8	55.4	49.4	42.6	33.0	19.7	6.4
Monthly mean temperature	26.4	26.3	24.9	....	49.9	73.4	66.0	61.9	55.9	44.5	34.8	25.5
Monthly range	55.0	52.0	51.1	55.0	50.5	54.3	66.5	68.9	59.3	49.8	50.7	59.5
Pluviameter.												
Number days rain fell	2	2	....	....	1	9	8	6	7	11	10	1
Number days snow fell	3	....	1	....	....	....	....	....	....	....	2	1.5
Greatest rainfall, inches	1.14	7	....	....	.21	1.36	.47	.69	.29	.43	1.45	....
Rainfall for month, inches	1.53	1.10	....	....	.21	4.96	1.45	1.32	.58	1.91	3.16	....
Greatest snowfall, inches	1.5	....	1	....	....	....	....	....	....	....	1.75	3.00
Snowfall for month, inches	3.3	....	1	....	....	....	....	....	....	....	2.80	7.5
Total precipitation	1.86	1.10	.1	....	.21	4.96	1.43	1.32	.58	1.97	3.44	.75
Anemometer.												
Predominating winds	Not in running order.											
Greatest number of miles in 24 hours												
Mean velocity for the month												

With reference to the subjects discussed in the lectures delivered during the year it is unnecessary to give an outline of the work, as that is shown in that portion of your report which gives a syllabus of the subjects taught in each Department. In conclusion I would direct your attention more particularly to what are the pressing wants of the Natural History Department.

1. The construction of gas cylinders in the Botanical Laboratory at an expenditure of not more than fifty dollars.

2. The purchase of four additional microscopes at an expense of one hundred dollars. This results from the increased attendance in the third year.

3. The purchase of specimens for the Museum, for which at least one hundred dollars should be granted.

4. The erection of a new greenhouse, and in connection with it a Botanical Laboratory, Lecture-room and suitable accommodation for students in Microscopy. Owing to our limited quarters this year I have been necessitated to divide the class in practical work, and thus have been employed alternate afternoons with classes doing the same work. We certainly are much in need of accommodation in this direction, and it is hoped you will be able to prevail upon those who have it in their power to put us on an equal footing with other institutions as far as this Department is concerned.

Your obedient servant,

J. HOYES PANTON.

PART III.

REPORT OF

THE PROFESSOR OF CHEMISTRY.

To the President of the Ontario Agricultural College:

SIR,—I beg herewith to submit to you my report of the work done at the Chemical Laboratory during the year 1890. As my details of analysis, etc., are somewhat extensive I shall condense my remarks in this introduction to as brief a space as possible.

My chief report in regard to instruction is in reference to the elementary work with the first year. For the first time we have attempted the teaching of this class in a thoroughly practical manner. Instead of lectures only we now have two afternoons during the week given to laboratory practice, supplemented by one lecture each week. In a word, I may say that I am more than ever satisfied that, though a little more expensive, this is the only satisfactory manner of imparting instruction in this subject. When we have covered an entire year's work with this class I shall be able to report to you more fully as to the general effect. The increase of work thus resulting demands increased room, apparatus and attention from the chemical department; but in all these respects I trust that by the liberal aid of the management we shall, during the coming year, be more fully equipped.

Through your kindness in arranging for my summer duty I was enabled to spend part of the summer of the past year in the organic department of the chemical laboratory of Harvard University. I would suggest that in no surer way can the controlling power of this institution increase its usefulness and create a feeling of enthusiasm and energy on the part of the staff than by making it possible for the various members of its staff to regularly visit and spend some time in the leading laboratories and experimental stations of America and Europe.

I submit my report to you under the following five heads in order

1. Fodder Corn, and Corn for Ensilage.
2. Corn Ensilage.
3. Report on Fish and Fish Refuse.
4. Sugar Beets.
5. Soil Temperatures and Drainage Waters.

FODDER CORN AND CORN FOR ENSILAGE.

At the beginning of 1890 extensive analysis of samples of corn grown by Prof. Robertson in connection with the dairy department were in progress. These were partially completed and reported upon to him early in January. Since then the unfinished work has been overtaken and I here present our complete analysis in this undertaking. Those who may be interested in this will find by reference to pp. 196-202 Report of Ontario Agricultural College and Experimental Farm for 1889, much that will prove interesting and valuable as supplementary to this. Messrs. Zavitz, Harcourt and Lehmann have been engaged at various stages of this work, which has required an immense amount of time and careful labor. There are in all forty-one results given which are the averages in each case of two closely agreeing duplicates, so that in all eighty-two samples of corn were analyzed.

First—I shall give the composition of the *Field Corn*, which was divided into three classes, according to size, viz., small, medium and large. Each of these classes is separated as shewn, according to the stage of maturity, and these further subdivided for analysis into leaves, stalks and ears. The names of the varieties are given which were in every case thoroughly mixed together before being analyzed.

TABLE I.

FIELD CORN.

CHEMICAL ANALYSIS OF FODDER CORNS GROUPED TOGETHER.

		Varieties of Corn in each group.	Chemical analysis of each group.						
				Water.	Crude Protein.	Fat or Ether Extract.	Soluble Carbohydrates.	Crude Fibre.	Ash.
SMALL.	"Out of bloom" and "Early milk stage."	Pearce's Prolific Stabler's 2nd Early Tuscarora Golden Dew Drop	Ears....	67.58	2.53	1.14	24.08	4.41	.26
		Golden Dew Drop Longfellow Angel of Midnight Self Musking	Stalks...	73.38	1.79	.57	16.42	7.46	.38
		100 Day Corn Crosby Sweet Fodder Hickox, Sweet	Leaves..	33.02	5.53	1.75	37.18	18.78	3.74
	"Silking" stage.	North Star Yellow Dent Egyptian Sweet	Ears....	72.25	3.04	.99	20.73	2.77	.22
			Stalks .	73.90	2.37	.62	15.66	7.13	.32
			Leaves..	25.73	8.48	1.99	38.19	21.32	4.29
MEDIUM.	"Out of bloom" and "Early milk stage."	White Flint Longfellow Early Adams or Burlington Wisconsin White Flint Pride of the North Calico Dent	Ears....	66.23	2.79	1.13	25.17	4.39	.29
		Edmunds Premium Dent Wisconsin White Flint Longfellow Flint Corn King Phillip Flint Canada Yellow Horse Tooth	Stalks..	70.71	1.28	.95	20.40	6.32	.34
		Early White Flint Compton's Early Evergreen Sweet Asylum Sweet Sibley's Pride of the North	Leaves..	31.53	5.60	1.66	38.87	18.49	3.85
	"Silking" stage.	Brazilian Flour Corn Wisconsin Yellow Dent Woodsworth's Yellow Dent	Ears ...	78.68	2.20	.53	16.72	1.70	.17
			Stalks..	69.32	1.80	1.30	19.31	7.92	.35
			Leaves..	33.03	5.56	1.49	38.91	18.01	3.20
	"Out of bloom and "Early milk stage."	Chester No. Mammoth Giant Prolific Sweet Ensilage	Ears ...	75.01	2.03	.17	18.25	3.75	.19
			Stalks..	75.86	1.19	.61	15.11	6.98	.25
			Leaves .	26.17	7.38	1.81	41.44	18.65	4.55
LARGE.	"Silking stage."	Horse Tooth Cranberry White Dent Leaming Dent	Ears ...	78.90	2.01	.70	15.95	2.27	.17
		Garrish White Dent Hickory King South Western	Stalks..	71.65	1.77	.93	16.93	8.43	.29
		Sheep's Tooth White Western Red Bob M. S. S.	Leaves..	32.34	7.22	1.92	38.85	16.07	3.60

Conclusions.

1. In fodder corns the water is greatest in the stalks, least in the leaves, more than twice as much being found in the former as in the latter. The water in these samples appears to have increased with age in ears and leaves and decreased in stalks; but too much reliance cannot be placed on this last conclusion as the varieties are to a great extent quite different.

2. The nitrogenous material or crude protein is greatest in the leaves and least in the stalks, the difference being greater the larger the plant. In immature plants such as these a large portion of the nitrogenous compound is of an inferior nature, chemically known as *non-protein*, which as the plant matures becomes changed into true protein or muscle and flesh forming material.

3. By fat we more correctly mean ether-extract, everything that can be dissolved out of the dried substance by ether. In addition to fats or oils, the ether readily dissolves gummy substances and chlorophyl, and, as fat or oil is not one of the compounds formed in the early stages of plant growth, these figures are controlled to a great extent by the greenness of the plant. The excess in the leaves of this constituent is thus explained: Fodder corns of all kinds contain little, if any, true fat.

4. By soluble carbohydrates we mean starch, sugar and the readily digestible portion of the woody fibre. In this respect again the leaves have the large percentage, about double that of the stalks.

5. In crude fibre the order of percentage in every case is leaves, ears, stalks.

6. As the leaves are the manufacturing headquarters of the plant and also the avenues of ash excretion to a great extent, we here find the great excess of the ash or mineral matter.

7. Pound for pound the three parts of these plants are to be valued in this order leaves first, then ears, then stalks.

TABLE II.

HILL CORN.

CHEMICAL ANALYSIS OF FODDER CORNS GROUPED TOGETHER.

		Varieties of Corn in each Group.		Chemical Analysis of each Group.					
				Water	Crude Protein.	Fat Ether (Extract.)	Soluble Carbohydrates.	Crude Fibre.	Ash.
SMALL.	"Out of bloom" and "Early milk stage."	Longfellow Smutt Nose Flint Sucet Fodder Crosby Corn Moore's Early Concord Early Mammoth Livingstone's Evergreen	Ears....	71.93	2.52	.95	19.23	5.12	.25
		Pee & Kay Corn Late Mammoth Sugar Stowell's Evergreen. Early Minnesota Black Mexican Hickox Sweet	Stalks...	75.73	1.40	.65	14.59	7.32	.32
		Pearce's Prolific Golden Dewdrop Canada Yellow Self Musking White Flint	Leaves..	37.18	6.12	1.11	35.49	16.56	3.54

TABLE II.—*Continued.*

		Varieties of Corn in each Group.		Chemical Analysis of each Group.					
				Water.	Crude Protein.	Fat Ether (Extract.)	Soluble Parbohydrates,	Prude Fibre.	Ash.
SMALL.	"Silking stage."	Triumph . Asylum Sweet	Ears ...	83.22	1.65	.59	15.88	1.56	.10
		Japanese Maize Old Colong	Stalks..	78.05	1.45	.52	13.46	6.28	.24
		Brazilian Flour Corn Tuscarora	Leaves..	44.94	8.05	1.35	26.99	16.09	2.58
MEDIUM.	"Out of bloom and "Early milk stage."	Woodsworth's Yellow Dent Pride of the North No. 23 Wisconsin Yellow Dent Wisconsin White Dent	Ears ...	66.73	2.70	.72	25.31	4.25	.29
		Calico Dent King Phillip Wisconsin White Flint Sibley's Pride of the North Stabler's 2nd Early	Stalks..	72.31	1.26	.63	17.13	8.35	.32
		Early Adams or Burlington Horse Tooth 100 Day Corn Compton's Early	Leaves..	29.63	6.07	1.51	39.37	19.35	4.07
	"Silking stage."	Leaming Yellow Dent	Ears ...	87.66	1.60	.53	8.50	1.64	.07
		Thoroughbred Flint Egyptian Sweet Evergreen Sweet	Stalks..	73.59	1.53	.74	15.60	8.28	.26
		Giant White Southern	Leaves..	29.92	7.48	1.38	37.89	19.22	4.11
LARGE.	"Out of bloom and "Early milk stage."	Stimpson's Yellow Dent	Ears ...	78.68	2.01	.43	15.21	3.51	.16
		Edmund's Premium Dent	Stalks..	71.00	1.00	.89	18.27	8.52	.32
		Chester County Mammoth	Leaves..	20.27	7.97	1.69	43.84	21.22	5.01
	"Silking stage."	Garrish White Dent Hickory King Cranberry Dent .	Ears ...	82.26	3.91	.67	9.82	3.19	.15
		North Star Yellow Dent Red Cob Ensilage Giant Prolific S. E.	Slalks..	72.35	3.45	.54	14.81	8.54	.31
		M. S. S. Sheep's Tooth South Western White Western	Leaves..	38.75	10.84	1.33	29.88	15.94	3.26

General Conclusion.

As in the case of the field corn, we here find that the leaves contain less water and more crude protein, soluble carbohydrates, fibre and ash, than the stalks or young ears.

TABLE III.

Ensilage Corns.—(Drills 3 Feet Apart.)

This investigation was carried out in connection with five varieties, as stated in the following table. 160 plants were taken weighing in green state 300.75 lb., in dry condition, 169.18 lb. These, therefore, in drying, lost in water 131.57 lb. or 43.7 per cent. of the entire weight. This table gives the analysis calculated to their green condition :

Varieties.		Water.	Crude Protein.	Ether Extract.	Soluble Carbohydrates.	Crude Fibre.	Ash.
M. S. S. Red Cob Ensilage Grand Prolific S, Ens. Pearce's Prolific Sibley's Pride of N.	Ears	8.82	1.63	0.49	13.98	2.97	0.11
	Stalks	72.87	1.25	0.58	16.69	8.35	0.26
	Leaves	28.14	6.87	1.52	40.37	18.82	4.28

The entire crop was made up as follows, by weight :

Ears	19.1	per cent.
Stalks	60 5	"
Leaves	20.4	"

So that reckoned to pounds, a ton of such corn would contain : ears, 38.2 lb. ; stalks, 1210 lb. ; leaves, 408 ; made up as follows :

Pounds per ton of Green Crop.

——	Water.	Crude Protein.	Ether Extract.	Soluble Carbohydrates.	Crude Fibre.	
Ears	308.73	6.22	1.87	53.41	11.35	0.42
Stalks	881.73	15.12	7.02	201.95	101 04	3.14
Leaves	114 81	28.03	6.20	164.71	76.79	17.46
Total	1305.27	49.37	15.09	420.07	189.18	21.02

Percentage, distribution of the different constituents in various parts.

——	Water.	Protein.	Ether Extract.	Carbohydrates.	Fibre.	Ash.
Ears	23.6	12.6	12.4	12.7	6.1	2.0
Stalks	67.5	30.6	46.5	48.0	53.3	15.0
Leaves	8.9	56.8	41.1	39.3	40.6	83.0

Composition of entire Green Plant.

Water	65 26	per cent.
Crude Protein	2.46	"
Ether Extract	9.75	"
Starch, sugar, etc	21.00	"
Crude Fibre	9.45	"
Ash	1.05	"
	99.97	

From the above tables it will be seen how large a portion of valuable food is stored up or contained in the leaf. Two-thirds of the water is found in the stalk; more than half of the crude protein is in the leaf; the starch, sugar and fibre are in the stalk and leaf in about the proportions of five to four; over four-fifths of the ash or mineral matter (bone material) is contained in the leaf. The high feeding and fertilizing value of the leaf of the fodder is thus demonstrated.

TABLE IV.

Broadcasted Corn.

Forty stalks of four varieties grown broadcast were separated into leaf and stalk, and duplicate analyses made of the samples, thus obtained:

Varieties.		Water.	Crude Protein.	Ether Extract.	Soluble Carbohydrates.	Crude Fibre.	Ash.
M. S. S.							
Red Cob Ensilage	Stalks	65.49	0.97	0.65	23.66	8.86	0.37
Giant Prolific S. Ens.	Leaves	26.15	4.48	16.5	42.08	21.85	3.79
Pearce's Prolific							

The former conclusions are at once found to hold true here also, in comparing leaf with stalk. The high feeding and manurial value of the leaf is thus shown in all varieties of fodder and ensilage corn, at all stages, and in broadcast and drill treatment.

CORN ENSILAGE.

The corn produced at the farm here during the year 1889 and fed during the winter of '89-90 was placed in two silos, one situated at the dairy barn and one at the large farm barn. The corn was of a varied nature and of varied degrees of maturity, as it had been grown for experimental purposes to test both variety and method of growing. The result was that the quality was not quite equal to the average, as the analysis given in the following table shows :

———	Water.	Crude Protein.	Fat, or Ether Extract.	Soluble Carbohydrates.	Crude Fibre.	Ash.
Dairy ensilage	81.72	1.06	0.73	11.52	3.93	1.04
Farm ensilage	81 47	1.18	1.12	10.82	4.30	1.11

The question arises at once as to how this compares with the average, the best and the worst. That this may be seen, and that the possible variations in the composition of corn ensilage may be seen, I give the average of 100 samples, also the maximum and minimum amounts of the different constituents as given by Dr. Jenkins of Connecticut :

———	Water.	Crude Protein.	Fat, or Ether Extract.	Soluble Carbohydrates.	Crude Fibre.	Ash.
Average	79.83	1.59	0.73	10.62	5.94	1.29
Minimum	64.40	0.70	0.20	5.10	3.00	
Maximum	87.00	2.80	1.80	22.20	10.00	

Investigation Elsewhere.

During the past year the experimental stations in connection with nineteen of the neighboring states have been investigating the ensilage and corn question, whilst in England, France and Germany much valuable work has been carried on of late years. The most important conclusions from these places have been embodied in reports and bulletins, and I propose to select the most valuable results and include them in this bulletin for the information of the farmers of Ontario. The name of the state or station will in this work sufficiently indicate the source of selections.

VARIETY OF CORN.

"Those varieties that will reach a fair degree of maturity are the best for fodder and ensilage purposes."—(*Cornell, New York*, 1889.)

"It is now generally believed that the more mature the grain while the stalk remains green, the better the ensilage will be. So that early maturing varieties are now considered most valuable."—(*Michigan*, 1889.)

For conclusions from an Ontario experiment see Ontario Agricultural College and Ontario Experimental Farm report for 1889, page 202, (Prof. Robertson's report.)

METHOD OF GROWING.

The general conclusion of experiments at all stations, based on chemical analysis and actual feeding tests, is that the best ensilage is produced from corn that has been drilled and not broadcasted. Every stalk of corn should be grown so that it has plenty of soil room in which to develop its roots, plenty of rich soil to draw nourishment from, plenty of air-breathing space, and plenty of sunlight falling directly upon all of its leaves. The immaturity of closely growing corn depends principally upon its lack of sunlight.

Prof. Roberts (*Cornell Experimental Station, New York*, 1888) valued as follows :—

One acre of hay, 1.5 tons	$18 00
“ broadcasted corn	19 72
“ drilled corn	35 74

“Special attention is called to the fact that heretofore it has been a common practice to sow or plant corn for fodder and ensilaging entirely too thick. Starch and sugar are not fully developed without an abundance of sunlight.”—*Cornell*, 1890.)

Wisconsin is the banner state for corn and ensilage. Its report is as follows: “After urging that no variety be used that will not mature in ample time to be gathered into the silo before there is danger of frost, another precaution is that the corn be planted so thin that considerable grain will mature. The ordinary varieties of field corn, either dent or flint, will prove satisfactory for ensilage.”

“To obtain mature corn, there must be more room for each plant, so thinner seeding is now practiced.”—(*Michigan*, 1889.)

Maryland Experiment Station reported in 1888 as follows in reference to fodder corn (p. 68):

——	Height.	Date cut.	Yield, ℔.
Drills, 3 ft. apart	9 feet.	Sept. 22	19,540
“ 18 in. “	7 “	“ 25	15,584
“ 9 in. “	5¾ “	“ 26	12,700
Broadcast	5 “	“ 27	11,464

The height of corn, date of cutting (maturity condition) and yield are all in favor of the drilled corn in this case.

“Thick seeding appears to cause a decrease in the relative amount of nitrogen in the albuminoid form. This diminishes the value of the fodder, as the amide nitrogen is considered to have a less nutritive value. The product of an acre of corn as ordinarily grown has usually a food value little more than half as great as the product of the same in drills as above advised.”—(*Maryland*, 1888, *Hy. E. Alvord.*)

“In the culture of ensilage corn the main object is to produce a large yield, and the best way to secure such a result is the important question. The most successful way to reach this end is to plant in drills, and I would recommend that the rows should be three feet apart, with the grains about four inches apart in the row.

“Experience indicates that it is best that the corn should be almost out of the milk state, or just beginning to glaze.”—(*Ohio, June*, 1889.)

WHEN TO CUT FOR SILO.

At this point especially chemical analysis of the corn product is of exceedingly great value, as the total weight alone of any green crop is not a safe test of its true feeding value. The latter depends upon the amount and digestibility of the dry constituents, such as protein, fat, sugar, starch, etc. So long as a plant is increasing in size, lengthening its stalks, leaves and roots, growing taller, not much protein, fat, sugar and starch will be deposited or accumulated as a surplus. Analysis has shown that the later stages of development of the corn plant add an enormous amount of the most valuable feeding constituents to the plant, and that cutting the plant too young means a great loss to the ensilage produced from it, whereas allowing it to mature more fully diminishes the percentage of water and greatly increases the weight of valuable food per acre.

" Repeated experiments have shown that to obtain the maximum amount of nutritive matter the corn must be allowed to reach a certain degree of maturity. The proper condition is apparently obtained when the corn has just passed the glazing stage in the flint, and is well dented in the dent corns. Experience and analysis indicate that corn cut at this stage is in the best possible condition for the silo.—(*Wisconsin*, '89)

" For some years corn was put into the silo when very green. We now know that to make ensilage of greatest value the corn should be more mature. The practice among those the most successful with the silo is to cut when the grain is beginning to glaze."—(*Michigan*, '89.)

" To get the most food value on an acre of corn it should not be cut till the plants begin to show signs of drying and withering and the seeds begin to glaze." —*Maryland*, 1888, *Hy. E. Alvord.*)

Date of Cutting.	Yield per acre.	Dry matter.	Protein.	Fat.	Carbohydrates.	Value.
	℔.	℔.	℔.	℔.	℔.	$
July 24	18,762	2,000	250.6	42	1,543.6	14 05
August 8	24,578	4,039	368.4	81.99	3,328.9	26 16
September 3	27,674	7,214.2	585.8	199.1	6,166.7	47 33

" From the above facts it will be seen that the real feeding value of the corn increased 166 per cent. after it had tasseled out, and 80 per cent. after it had nearly reached the roasting ear stage. This being so, the greatest care should be taken to select those varieties of corn intended for ensilage that will fully mature before frost in the localities where it is proposed to grow them, a less number of tons of mature corn being in all cases more valuable than a much larger number of tons of immature corn."—(*Cornell*, 88.) In March, 1890, Profs. Roberts and Wing, of Cornell, issued a bulletin on corn and ensilage. Basing their conclusions on their own work of 1889, the work of New Hampshire, Pennsylvania and the Geneva Station, New York, they state : " It would seem as though the proper time to cut corn for ensilage was definitely settled by these experiments. An increase of more than two hundred per cent. between the periods of bloom and ripening cannot be ignored, even though the proportion of the more valuable albuminoids is somewhat lessened. What gives the matter additional strength is that these experiments, including all the work so far done in this direction that has come to our notice, are unanimous in their conclusions."

" Bulletin 9, 1889, Missouri Experimental Station, discusses the life history of corn, and contains this among many important statements : " The considerable increase between September 10 and September 17 (amounting to 24 per cent. of the total weight) indicates clearly that a crop of corn should remain in the field as long as possible, the weather permitting, to reach its greatest perfection."

The Massachussetts report for 1885 says (p. 53): "One ton of green fodder corn in tassel contained in one case 307.2 ℔. of dry vegetable matter; whilst in the case of the seed just beginning to glaze, 463.8 ℔. of dry vegetable matter are found in one ton, a difference of 156.6 ℔. in favour of the more matured state of the growth." And the report for 1886 says: "The ensilage of a more matured fodder corn has a higher feeding value pound per pound, compared with that cut at an earlier stage of growth."

It may be interesting to know what the great increase in dry matter consists of that takes place in the later development of the plant. Let me refer again to the Massachusetts report for 1885 (p. 53), cited above, to show the composition of dry matter in fodder corn:—

——	July 22.	July 29.	August 5.	August 13.	August 27.	September 3.
Ash	8.54	8.00	5.95	5.69	4.70	4.22
Cellulose	26.01	27.28	26.40	24.11	24.30	20.93
Fat	3.24	2.65	2.26	2.13	1.81	2.63
Protein	17.19	14.42	11.86	11.23	8.87	9.17
Carbohydrates	45.02	47.64	53.53	56.84	60.32	63.05

Thus we see that the increase is principally in the form of soluble carbohydrates (starch and sugar), which are formed from the air and do not deplete the soil. This table, it must be carefully noted, gives merely the percentage composition, not the total quantity per acre.

Next let us refer to an investigation made by Mr. E. F. Ladd, at the New York Agricultural Experimental Station, Geneva, (1889), Report pp. 88, *et seq.* The figures are in pounds per acre.

Per acre.	Tasseled July 30.	Silked Aug. 9.	In milk Aug. 21.	Glazed Sept. 7.	Ripe Sept. 23.
Total yield	18,045	25,745	32,600	32,295	28,460
Water	14,426	22,666	27,957	25,093	20,542
Dry matter	1,619	3,078	4,643	7,202	7,918
Ash	138.91	201.30	232.15	302.48	364.23
Protein	239.77	436.76	478.69	643.86	677.78
Crude fibre	514.19	872.93	1,261.97	1,755.85	1,734.04
Carbohydrates	653.91	1,399 26	2,441.29	4,239.82	4,827.60
Fat	72.20	167.75	258.90	259.99	314.34

"From the date of full tasseling until ripe the dry matter increased 4.8 times, from 1,619 pounds to 7,918 pounds per acre. From full silking until ripe the increase in dry matter was 2.5 times."

On page 90 the conclusions of two years' investigations are thus stated by Mr. Ladd: 1. That the greatest weight of green fodder is between the period of full silking and the milk stage of kernel. 2. That the total weight diminished after this date, but the total dry matter increased. 3. That as the corn approaches maturity the per cent. of amide nitrogen diminishes, while the albuminoid nitrogen increases, thus seemingly increasing the feeding value of the crop. 4. That the sugars and starch increase rapidly during the later period of growth and maturing of the corn plant, and that these are the most valuable portion of the nitrogen free extract (soluble carbohydrates). 5. That between the period of glazing and full ripening of corn there was a large increase in amount of sugar and starch. 6. That for the greatest nutriment, considered from a chemical standpoint, corn should not be cut before it has well ripened. 7. That the B. and W. corn cannot in ordinary culture be matured in this latitude.

"The general conclusion to be drawn from our experiments, then, as to the proper time of harvesting corn, is that it should be allowed to stand as long as the climate of the locality and the purpose in view will permit, since it is continually increasing in value per acre.—(*Pennsylvania*, '88.)

A bulletin was published in April 1890 by Wm. H. Caldwell, of the Pennsylvania Agricultural Experimental Station on "Indian Corn as a grain and forage crop." He states: "The results of work done at several of the agricultural experiment stations last season show that a great deal of the dry matter (food material) of the corn crop is lost by cutting the crop before it reaches maturity. Last season's work showed such a large increase of dry matter from the time the kernels began to glaze, until matured and field-cured (being more than previous to that time) that it was deemed advisable to determine the increase only between these last two stages of growth this season."

YIELD PER ACRE—DRY MATTER.

	When kernels began to glaze.	In field-cured material.	Gain by allowing crop to mature.
Average of Flints, 1889	3,404	4,785	1,385
Average of Dents, 1889	7,078	8,318	1,240
Average of Dents, 1888	5,259	7,159	1,900

"The results show that fully 20 per cent. of dry matter is gained by allowing the crop to mature."—*Pennsylvania, 1890.*

	July 26.		August 5.		August 19.		September 16.	
	Water.	Dry material	Water.	Dry.	Water.	Dry.	Water.	Dry.
Southern	91.25	8.75	89.18	10.82	84.95	15.05	75.40	24.60
Northern Field Corn	87.75	12.25	86.10	13.90	81.45	18.55	72.40	27.60
Sanford	90.85	9.15	86.79	13.21	86.75	13.25	77.20	22.80
Pride of the North	90.65	9.35	87.56	12.44	82.25	17.75	7	29.55

PERCENTAGE INCREASE OF DRY SUBSTANCE.

——	July 26 to Sept. 16.	August 9 to Sept. 16.
Southern	181 per cent.	63,4 per cent.
Northern Field Corn	125 "	48.8
Sanford	149 "	72
Pride of the North	216 "	66.4 "
	671	250.6
Average	167.75 per cent.	62.6 per cent.

i.e. 167¾ per cent. is the average increase from July 26 to September 16—(52 days.)
62.6 " ' " August 19 to September 16—(28 days.)

From August 19 to September 16, the increase in dry matter is 37.3 per cent. of the total increase from July 26 to September 16.—(*New Hampshire, 1888, G. H. Whitcher.*)

CHANGES AND LOSSES IN SILO.

There is always a loss in the material put into the silo during the continuance of the process ; it will vary from a very small amount to one-half of the total dry matter. The loss is due principally to the productions of acids by fermentations ; some of these acids and the other compounds produced at the same time escape and are a total loss ; even if retained the acids, of course, are not so valuable as foods as the substance out of which they have been formed. The sourness or acidity of a sample of ensilage is therefore an indication of the destruction of valuable plant material, and the production of as sweet a sample as possible is recommended for many obvious reasons. The acid will vary from .02 per cent. to over 2 per cent. When there is little acid the ensilage is called sweet ; when there is much acid, it is called sour. The changes taking place in fermentation affect the constituents of the plants in the following order : sugar, starch, fibre, nitrogenous compounds. It becomes therefore a very important question to know how the fermentation and the consequent loss of from 5 to 30 per cent. may be checked.

Water—The presence of a large quantity of water in the corn certainly increases its tendency to fermentation. We know that matured grains, straws, well cured hay, succulent food thoroughly dried, manure deprived of its moisture will not ferment. By putting in the corn then with not too much water we shall prevent souring. As corn matures its percentage of water gradually diminishes ; this has been proven in our experiments here and at many other stations. The following table shows the percentage of water in fodder corn at different stages as given in the Massachusetts report, 1885 :

——	July 22.	July 29.	August 5.	August 13.	August 27.	Sept. 3.
Water	88.61	85.76	84.64	82.08	81.15	75.81
Solids	11.30	14.24	15.36	17.92	18.85	23.19

" The change from sour to sweet ensilage has accompanied a greater maturity of the corn ; each year the corn has been planted a little thinner and allowed to become more mature before being put in the silo, and each year has seen a less degree of acidity in the ensilage. Examination of the analysis of ensilage received from various silos in the state, as well as our own, would seem to indicate that the acidity varies with the amount of water present in the corn; the more water the greater the per cent. of acid."—*Winsconsin, 1889.*

Condition at Maturity.—"The marked increase of nitrogen free extract (members of the starch family) as the corn matures and the progressive decrease of acid in the ensilage show how greatly the corn improves as it approaches ripening. The relatively large amount of water and crude fibre in the young plant justifies the epithets 'slush' and 'swill' as applied to the ensilage from such material."—(*Michigan Experimental Station Report*, *1889*). This statement accompanies a table of analysis of ensilage from which the following is taken:

No. 1,	August	25,	wilted two days, then ensiled,	1.10	per cent. acid.
" 2,	"	27,	put in fresh................	1.02	"
" 3,	September	1,	wilted two days............	0.95	"
" 4,	"	3,	put in fresh................	0.91	"
" 5,	"	8,	wilted two days............	0.87	"
" 6,	"	10,	put in fresh................	0.80	"
" 7,	"	13,	put in fresh................	0.81	"

September 14, killing frost.

The more matured a plant, the more fixed, less changeable are its constituents, *i.e.* the constituents of a young plant will suffer change or decomposition more rapidly than those of the same plant more matured.

Temperature—Mr. George Fry of England, in his work "Sweet Ensilage," laid great stress on the necessity of raising the ensilage to 122° F., thereby to stop the various ferments. The most favorable temperature for the development and working of the various ferments is about 95° F., and most of them cease at 122° F., but some continue active to 140° F. Fry says that excess of water in succulent food prevents this rise of temperature and that sour ensilage thereby results, as the ferments are not then destroyed.

In opposition to Fry, Prof. Alvord, of Maryland Experimental Station, says: "Temperatures 110° to 140° F. are most favorable for their development and activity, and it requires at least 185° F. to destroy them, while fermenting, ensilage does not often exceed 140° F., and no authentic record of 150° F. can be found."

Along the same line Prof. Johnson, of Michigan, says: "I am of opinion, however, that positive evidence to sustain this theory is almost, if not entirely, wanting. Enough careful work has not been done to demonstrate it beyond question."

Upon the subject of ensilage, Dr. Burrill, of Illinois, makes the following remarks in a bulletin published November, 1889.

"It is plain that a body cannot be raised to a higher temperature through the process of fermentation than the organism causing such fermentation is capable of enduring. There seems, indeed, to be no reason for supposing that the heat should be greater than that under which the organism finds its best development, because above this point the action is retarded; hence less heat is produced. When slow filling and consequent high temperature is relied upon, the resulting product is in a widely different state as to fermentive changes from that so-called sweet ensilage obtained without heat. There is much less loss through fermentation in the latter case. The best results are obtained by the most nearly perfect exclusion of the air. For this purpose, uniform distribution upon filling the silo is of more importance than persistent trampling, because the pressure of the mass must be mostly relied upon."

All things considered the main points undoubtedly are (1) to have the corn well matured, (2) to house it and fill it uniformly, so as to exclude air, (3) to keep it as free from air as possible; with these well observed, a fair sample of sweet ensilage may always be expected.

Effect on the nitrogenous compounds.—During the changes taking place in the silo a decided and important change is effected upon the protein or muscle-forming portion of the food; some of it is changed from the protein to the non-protein form, from a condition capable of producing flesh and muscle to a condition incapable of this.

Michigan Experimental Station, Bulletin 49, May, 1889, states: "A small loss of crude protein is common in the silo, but the change from albuminoid to amide condition of the nitrogen compounds is the most striking feature of ensiling. These two facts point to a loss of value in ensilage as compared with the fresh corn stalks, or even the dry material, when it has been rapidly and perfectly cured."

The same conclusion was arrived at by Dr. Voelcker in 1886-87, and reported upon to the Royal Agricultural Society, of England, Report XLVI., p. 403. Silage was made from grass, and compared with hay from the same. "The total loss due to fermentation, evaporation, etc., in making the silage was 7.29 per cent. on fresh grass; of this 3.25 per cent. consisted of water. The loss of total nitrogen when, as here, no drainage is allowed to flow away, is very slight; but the nitrogenous bodies have undergone considerable change from the albuminoid to the non-albuminoid condition. The woody fibre, as indeed the whole of the fibre, has been diminished; insoluble albuminoids are lessened, and the soluble albuminoids increased. In the hay the nitrogen has undergone but little change."

Lawes and Gilbert, of England, report as follows, 1884-85: "Not only is there a loss of nitrogenous food material, but a very considerable proportion of the nitrogenous substance which remains is degraded into compounds, some of which are of no value as food (ammonia for example), whilst others, forming a much larger proportion, are, to say the least, of reduced food value. Further, besides the loss and the degradation of nitrogenous substance, it has been shown that there was also more or less loss of non-nitrogenous matter; whilst there is no evidence that woody fibre of a certain degree of induration has been rendered more soluble." (*Experiments on Ensilage, p. 23.*)

Effect on Nitrogen.—"The analyses show a decrease in the total nitrogen of 0.29 per cent., or a loss of 14.6 per cent. of the total nitrogen in the fodder. There was a decrease of 2.58 per cent. of albuminoids in the total solids, equivalent to a loss of 24.5 per cent. of the total albuminoids put in the silo. It will be understood that the albuminoids are indispensable nutrients of any food ration, and are not replaceable by any other class of nutrients. The loss is in part due to their reduction into amides and other degraded nitrogenous compounds. Thus, while there was only 0.3 per cent. of non-albuminoid nitrogen in the corn fodder, there was 0.4 per cent. in the ensilage. Of the total nitrogen in the corn fodder, only 15.15 per cent. was in the form of non-albuminoid nitrogen, while in the ensilage there was 25.44 per cent. These degraded forms are supposed to have about the same feeding value as the soluble carbohydrates." (*Illinois, Aug., 1888, Thos. J. Hunt*).

"The amides of sweet and field corn ensilage increased in silo from 8.69 per cent. to 18.94 per cent., a distinctive loss." (*Missouri, Prof. Sanborn.*)

Ensilage as a Food.

Water.—The water varies from 64.4 to 87.0 per cent. From our investigations it appears that the best, the sweetest, and the greatest amount of ensilage will be produced when the amount of water lies near 75 per cent., between that and 80 per cent.

Crude Protein.—In food analyses, this of course includes the less valuable amides, which are not flesh and muscle formers but heat producers. The following table gives a few analyses separating the true protein from the amides or non-protein. I have said before that in the silo true protein will be changed to amides to a certain extent ; this in addition to the amides always existing in young growing plants, will give us a high per cent. of non-protein:

—	Total crude protein.	True protein.	Amides or non-protein.	Per cent. of true protein.	Per cent. of non-protein.
New York, 1886	0.85	0.50	0.35	58.83	41.17
" "	0.85	0.45	0.40	52.95	47.05
" "	1.08	0.75	0.33	69.45	30.55
" "	1.17	0.73	0.44	62.40	37.60
Wisconsin, 1888	1.92	0.99	0.93	51.58	48.42
Dr. Voelcker, 1884	1.12	0.68	0.44	61.10	38.90
Pennsylvania, 1889	2.15	.3	0.72	66.52	33.48
" "	2.35	.75	0.60	74.47	25.53
" "	2.43	0.98	0.45	81.48	18.52
" "	2.34	1.0	0.74	68.42	31.58
Michigan, 11 analyses, 1889	1.32	....	0.50	62.12	37.88
Average	....	....	....	63.36	36.64

German investigators have found non-protein in considerable quantities in roots, potatoes, malt sprouts and fodder plants of all kinds, the average in the last case being about 30 per cent, In four analyses of malt sprouts Kellner found an average of 27.40 per cent. (Armsby). The average so far found in corn ensilage is in excess of that usually found in the freshly gathered plants, and this large quantity of non-protein to a certain extent takes from the value of the ensilage and demands a liberal addition of nitrogenous foods to it to make complete rations.

Fat.—There is little or no true fat in corn ensilage, unless it be made from corn well matured. The fat represented in our tables is ether-extract more properly, and consists largely of chlorophyll, waxy matters and acids. The amount of fat, therefore, may be considered as of little or no value.

—	Water.	Protein.	Fat.	Soluble carbohydrates	Fibre.	Ash.	Nutritive ratio.
Colostrum	71.7	20.7	3.4	2.5	....	1.8	1: 0.5
Whole milk	87.0	4.0	3.7	4.6	....	0.7	1: 3.3
Grass	75.0	3.0	0.8	13.1	6.0	2.1	1: 7.0
Corn ensilage	79.8	1.6	0.7	10.6	6.0	1.3	1:11.0

Nature's feeding is from colostrum, to whole milk, to green grass. By consulting our table we see that corn ensilage is alone not sufficient to take the place of either whole milk or good pasture grass, that the great lack is in nitrogenous constituents, flesh and muscle formers, and that the use of ensilage in a ration demands the addition of foods containing protein and fat, such as good hay, grains, bran, cake, in such proportions as must be regulated by the circumstances of the feeder and market prices.

In the early history of ensilage it was usually considered a complete ration; experience, however, does not seem to justify this conclusion, but better results follow the use of some more nitrogenous food in connection with the ensilage, such as oil meal, wheat bran, clover hay, or other nitrogenous foods." (*Ohio*, *June*, *1889*).

CORN SILAGE *vs* FIELD BEETS AS FOOD FOR COWS.

1. "The dry matter of corn silage and of field beets is at least equal in value to the dry matter of the better grades of stock feed in ordinary use, when fed in properly adjusted rations.

2. Corn silage is slightly superior to field beets as a flesh or fat producer, and beets are slightly better than corn silage for milk production." (*Ohio*, *June*, *1889*, *Hickman.*)

"The large accumulation of the data of Europe and America in my possession fail to show that a ton of dry matter taken out of a silo is superior to a ton of dry matter drystored." (*Missouri*, *Prof. Sanborn*).

"The silo goes with high pressure farming; those who are satisfied to carry more cattle than can consume the straw and corn-stalks usually produced on the farm have little need of a change. The farmer who needs the silo is one who is carrying a large number of cattle upon a given area and needs more 'roughage' for them. Before adopting the silo many should change their system of farming." (*Prof. Henry*, *Wisconsin*, *1889*).

CONCLUSIONS.

1. Poor corn will make poorer ensilage.
2. The best ensilage can be made only from the best corn.
3. Choose early maturing varieties.
4. Sow in drills so as to allow to mature.
5. Cut when well on to maturing.
6. Put in a proper silo.
7. Feed in moderate quantities.
8. Supplement by foods rich in fat and nitrogen.
9. Ensilage will not pay unless well made.
10. Do not expect too much from its use.

REPORT ON FISH AND FISH REFUSE FROM BRITISH COLUMBIA, RECEIVED MARCH, 1890.

SAMPLE I.—Head and entrails of large fish, (salmon).
SAMPLE II.— " " " "
SAMPLE III.—Finely divided refuse from canning factory.
SAMPLE IV.—Herrings whole.

Taken from the cans as received these consisted of the following amounts of water and dry substance :—

——	I.	II.	III.	IV.
	Percentage.	Percentage.	Percentage.	Percentage.
Water	70.41	77.17	77.04	77.50
Dry matter	29.89	22.83	22.96	22.50

By drying as thoroughly as possible the amount of water was reduced to about five per cent. so that in drying the original material was reduced to nearly one-fourth of its original weight.

The dried material gave the following by analysis :—

——	I.	II.	III.	IV.
	Percentage.	Percentage.	Percentage.	Percentage.
Water	5.91	5.76	2.08	7.48
Ash	17.62	18.48	13.54	10.15
Organic matter	76.47	75.76	84.38	82.37
Oil or fat	27.21	25.55	66.95	18.29
Nitrogen	6.32	7.80	5.55	7.96
Phosphoric acid	5.70	6.67	4.79	2.72
Potash	0.36	0.51	0.58	0.21

If the materials were deprived of their oil or fat and manufactured into a dried we powdered fertilizer without the admixture of anything foreign or additional, it wou have about the following composition, as far as its most valuable fertilizing constituents are concerned.

——	I.	II.	III.	IV.
	Percentage.	Percentage.	Percentage.	Percentage.
Water	10.00	10.00	8.00	10.00
Nitrogen	8.50	10.00	12.00	9.50
Phosphoric acid	7.50	8.50	11.00	3.50
Potash	0.50	0.50	1.00	0.30

" An analysis by Arendt of Norwegian fish-scrap gave of:

Moisture	17 per cent.
Nitrogen	10½ "
Phosphoric acid	4 "
Organic matter	72 "
Ashes	12 "

other samples have shown more phosphoric acid (13 to 15 per cent.) and less nitrogen (8½ to 9 per cent). Some of them were of scrap than had been steamed to remove the oil." (*Prof. T. H. Storer*).

It will thus be seen that a most excellent fertilizer can be produced from any one or all of the samples of fish refuse sent here for analysis by (*a*) extracting the fat or oil, (*b*) removing the excess of moisture by drying, (*c*) thoroughly pulverizing. The fertilizer thus produced would be rich in nitrogen and phosphoric acid, but would be deficient in potash, to make a *complete* fertilizer of it an addition of sulphate of potash might be made. Norwegian fish potash guano thus produced contains as follows according to Dr. Griffiths (" Artificial Manures.")

——	Cod and potash.	Herring and potash.
	Percentage.	Percentage.
Nitrogen equal to ammonia	7.00	7.05
Phosphates, (fish bone)	20.00	8.00
Potash, (sulphate)	15.00	15.00
Magnesia	10.00	10.00
Sandy matter	1.00	1.00
Water	5.00	5.00

" These fish guanos are shipped from Jensen's works in the Lofoden Islands (Norway) and conveyed to England;" according to the same authority English fish guanos (without potash) sell from £5 10s. to £6 per ton. American fish and potash sells at from $25 to $35 per ton. Potash and phosphates are added to the fish refuse and they contain from 2½ to 4½ per cent. of nitrogen from 3 to 13 per cent. of phosphoric acid, and from 3 to 6 per cent. of potash.

NORWEGIAN FISH GUANO.—In the report of the transactions of the Highland and Agricultural Society of Scotland for 1886, Mr. William Watt, of Aberdeen, thus describes (p. 201) the Norwegian method of treating the cod refuse. "The raw material principally used at the Norwegian manufactories are the heads and bones of cod, with the tissue of livers from which the oil has been extracted; but use is made also of the softer parts of the fish, the heads and viscera of herring, the flesh of whales and sharks and all kinds of damaged or otherwise useless fish, whether dried or fresh. First quality guano is produced from the bones and head of cod, in the proportion of one of the former to five of the latter, and the manner of manipulation may be thus described :—The raw materials are spread out to dry in the sun, the heads being first strung together for convenience in handling. They then go to the factory and are there first chopped small by a mincing machine, and next passed on to a kiln where the remaining water is sent off in vapour. Up to this point the bones and heads are treated separately, but now they are mixed together in their due proportions and ground between large millstones, the result being a 'grey guano' ready for sale. When salty or oily materials are used the mass, after being chopped, but before reaching the kiln, is first exposed for a time to steam pressure in a suitably constructed iron cylinder. In lieu of this mode of extraction the materials may be put into a jacketed pan and exposed for a time to steam heat, with constant stirring and the removal of the oil set free, the elimination being completed by hydraulic pressure. Without the complete extraction of oil and salt and effective drying, a finely pulverised guano cannot be obtained."

Prof. Storer, of the Agricultural Department of Harvard, in his "Agriculture in some of its relations to Chemistry" thus describes the method adopted in the Eastern States : "The American fish guano is a product obtained incidentally in the manufacture of oil from a coarse sort of herring called the menhaden or pogy In order to get their oil the pogies are boiled in water to a sort of porridge or thick soup, which is pressed in a mill, just as ground apples are pressed in the manufacture of cider. The oil that was contained in the flesh of the fish collects upon the surface of the expressed liquid, while the half-dry pomace or residue left in the mill is the fish scrap. Sometimes this product is pressed into barrels at once for transportation, though more commonly perhaps it is left in loose heaps to heat and dry out to a certain extent. Occasionally the pomace is spread out upon platforms to dry pretty thoroughly and is afterward ground in a mill."

USES OF THE OIL THUS OBTAINED.—I am not in a position to say from the samples, as they were very offensive and the quantity of oil obtained very small to what uses the oil could be put—the probability is that it could be easily disposed of for manufacturing purposes. Mr. Watt on p. 203 of the article above referred to says : "The oil from the herring is serviceable for a great many industrial purposes—for the preparation of leather, in the treatment of vegetable fibres prior to spinning, in the manufacture of soap (which is the great use to which the analogous menhaden oil is turned in America), and for lubrication and burning."

COMMERCIAL VALUE OF THE MATERIAL.—From one ton of undried refuse and herrings there should be obtained at least 100 lb. of oil, and perhaps much more, and from 400 to 500 lb. of fish guano or fertilizer, the latter worth between $20 and $30 a ton, or the ton of raw fresh material should produce oil and fertilizer worth at least $15 and perhaps $20. On this question of value production Mr. Watt speaks as follows : "From ten tons of average herrings in the fishing season there would be obtained 1½ ton of oil perhaps and two tons of fish guano. If say 300 gallons of oil were obtained, which is a moderate estimate, and the price to be 2s. a gallon, which might probably be realised, the oil of ten tons of fish would produce £30. Then there would be 2 tons of guano at £10 per ton. Thus if these estimates are at all trustworthy something like £5 a ton might be realised through the manipulation of herrings as a raw material of oil and manure." The above value of £5 per ton is, perhaps, too high for this country, but, making allowance for that, our valuation of $15 to $20 per ton will not be much astray.

Conclusion.—From the consideration of the whole question, I am of the opinion that the manufacture of the refuse into fertilizer is strongly to be recommended because :

1st. It will thus utilize a bye-product that otherwise is a total loss.

2nd. It will prevent the waters from becoming contaminated.

3rd. Its proper management must tend towards a more healthful surrounding.

4th. Its return to the soils of the farm will partly offset the waste of our cities by sewage carried to the lakes and rivers.

5th. If properly handled *it will pay well.*

From the great importance of this question to the health of the community, the welfare of the fishing industry and the progress of agriculture, I have endeavored to reply at this length.

ANALYSIS OF BEETS GROWN AT THE ONTARIO EXPERIMENTAL FARM, GUELPH, 1890.

TABLE I.

Analysis by C. C. James.

Lot.	No. of Beets.	Net Weight.		Analysis of Juice.			——
				Brix.	Sugar.	Purity.	
		lbs.	oz.				
1	4	4	8	17.05	15.00	85.07	Fair shape, average, one above ground.
2	4	3	4	20.05	17.05	85,03	Fair shape, smaller.
3	5	3	13	21.00	16.00	76.02	
4	4	4	8	16.03	14.05	88.09	Exceptionally good.
5	4	4	4	17.03	14.08	85.05	Good shape.
6	5	4	4	16.03	14.00	86.00	Good shape.
7	1	3	3	14.00	10.00	71.04	Large, misshapen, above ground.
......	27	27	12	....	....	....	
Average 1890		1	0½	18.03	15.08	83.64	
Average 1889		2	1½	21.50	18.00	83.70	

TABLE II.

Analysis by W. Skaife.

—	Weight.	Analysis of Juice.		
		Solids.	Sugar.	Purity.
	lbs. oz.			
26 beets divided into 5 lots, taken from carts as they arrived from the field	....	18.00	14.06	81.11
	....	19.00	15.03	80.53
	....	17.05	14.05	82.85
	....	18.00	15,00	83.33
	28 12	18.00	14.08	82.22
Average of 26 beets	1 1⅔	18.01	14.84	82.00
Extra large beets, outside row, 3 beets	10 8	13.05	9.05	70.04
5 beets	7 11	16.05	12.05	75.08
Average of 8 beets	2 4⅜	15.04	11.04	74.03

Our beets for 1890 were, therefore, smaller than those of 1889, lower in sugar, but of the same degree of purity.

Sugar Beets.

In the following pages are given the results in detail of the chemical investigations of the sugar beets grown experimentally during 1890 in the Province of Ontario. By reference to our report for 1889, it will be seen that during the preceding year a similar experiment upon a smaller scale was carried out and the results published. The seed for both of these series of experiments was furnished by Mr. Wilfrid Skaife, B.A. Sc., sugar expert and manufacturer, of Montreal, Que., it having been imported from the establishment of Herrn Karl Krueger, Muecheln, Germany. As indicated in the following tables, these beets were grown in various parts of the province, whence fair samples were taken and shipped to this laboratory by Mr. Robt. H. Lawder, who was specially deputed for that purpose. Here they were analyzed by Mr. Skaife and myself. In some cases the tables contain the results of work done separately, in other cases, as stated, the results represent our combined work. In every case the utmost effort has been made to obtain accurate average results of the beets produced ; in a few cases where the beets were a long time on the journey, a little wilting has evidently produced a slight effect.

In all cases the analyses state :

Solids = total solids found in the juice expressed.
Sugar = sugar " " " "
Purity = $\frac{\text{sugar}}{\text{solids}}$ " " " '

In determining the amount of sugar in the beets it is usual to take 95% of the amount of sugar found in the juice. We have left all our calculations, however, as sugar in juice or polariscope reading.

For further information as to amount of produce and cost see Prof. Shaw's report on sugar beets found in this same volume (1890 Ontario Experimental Farm report). These results we have given in detail, and by themselves, as one acre of roots were grown at the farm here. The only other experiment reported upon in this series of equal extent is that of Mr. T. B. Carlaw, of Warkworth, who also grew one acre. For this report see under Cobourg District, in following tables.

Next I shall give our summary of results by districts, and average for the whole province, reserving the detailed analysis for the end.

In this table the number in each case is the number of samples analysed :

District.	No.	Solids.	Sugar.	Purity.
Guelph	28	17.21	13.52	78.56
Whitby	32	17.40	13.35	78.54
Cobourg	11	17.07	14.28	79.23
Bay of Quinte	8	16.93	13.35	78.43
Oakville	11	16.09	13.37	78.41
Esseex	8	16.74	13.41	78.63
Various	19	17.37	13.92	80.10

General Summary for the Province.

Total number of beets analysed	419
" weight " "	518 lbs. 2 oz.

——	No. of Samples.	Average Weight.	Solids.	Sugar.	Purity.
78 Beets over 2 lbs. each in weight	35	2 14	16.45	12.35	75.1
341 Beets under 2 lbs. each in weight	82	0 14	17.41	14.10	81.02
Average of all	117	1.4	17.12	13.58	79 32

The 1889 samples analysed at the Chemical Laboratory, Guelph, (26 in number), showed an average weight of 2 lb. 2 oz., solids 18.95 per cent., sugar in juice 14.35 per cent., and purity 75.7 per cent., from which it will be seen that the beets of 1890 were smaller, slightly lower in sugar, but higher in purity, and represent a class of beets much more profitable for sugar making than those of 1889. The difference in value between large and small beets is clearly brought out in the above general summary, the smaller beets being the richer and of higher purity.

The following table, (C. C. James), presents results based upon the cultivation of the beet. So many samples came in having green tops, showing lack of covering or cultivation, that it was thought advisable to present the growers with direct evidence of the great value and necessity of thorough cultivation in the production of beets for sugar making. Beets of various sizes were taken so that we here have a comparison based on size as well as on cultivation.

——	——		No.	lb. oz.	Solids in Juice.	Sugar in Juice.	Purity.
Well cultivated	Small, well grown good shape	tops....	4	2 0	20.50	17.00	82.9
		bottoms	4	2 0	21.00	18.00	85.7
	Large, well grown good shape	tops....	2	3 8	17.00	14.00	82.4
		bottoms	2	3 8	19.00	15.25	80.3
Poorly cultivated	Large, much above ground	tops....	3	4 4	14.25	10.00	70.2
		bottoms	3	5 13½	15.00	12.00	80.0
	Large, much above ground	tops....	2	3 12	16.00	12.00	75.0
		bottoms	2	3 12	16.50	13.00	78.8
	Medium, much above ground	tops....	2	2 0	18.00	13.00	72 2
		bottoms	2	2 6	20.00	16.00	80.0
	Medium, much above ground	tops....	2	2 6	13.50	6.75	50.0
		bottoms	2	2 11	16.50	10.75	65.0
	Medium, much above ground	tops....	5	4 10	18.00	12.75	70.8
		bottoms	5	4 13	18.50	15.50	83.8
	Medium, much above ground	tops....	5	3 11	18.00	14.00	77.7
		bottoms	5	5 0	19.00	14.50	76.3

In each case the tops and bottoms are of the same beets. In the well grown beets the roots were equally divided by weight, in the poorly grown they were divided by the ground line on the roots. The second sample proved to be remarkable beets, they came from the Bay of Quinte district. In every case more sugar is found in the bottoms and as shown in the following summary the higher purity belongs to the well grown samples.

——		Solids.	Sugar.	Purity.
Well grown, average of	tops....	18.75	15.5	82.7
	bottoms	20.00	16.6	83.0
Poorly grown, average of	tops....	16.3	11.4	69.9
	bottoms	17.6	13.6	77.2

The analyses contained in the preceding tables confirm what has elsewhere been universally observed, viz., that there is a very great difference between the out-of-ground portion, of a poorly grown beet and the under-ground portion; that not only is there less sugar but the purity is much less, and that to produce sugar beets of the best quality they must be kept well covered. In this respect many of the samples grown in Ontario are faulty, whereas even in the case of larger beets which have been carefully covered the percentage of sugar and purity have both been high.

Conclusions by C. C. James.

Yield.—As to this we have but little reliable information, calculations from a row or two not being always trustworthy. The calculation of Mr. T. B. Carlaw, of Percy, Northumberland county, is interesting, as he grew an acre of beets, the product being estimated at 26.7 tons.

Shape and Size.—Great irregularity was manifest in most of the samples ; in many cases, however, the ideal of the French and German was attained. Our results certainly lead to the conclusion that the tapering, well shaped beet weighing from ¾ to 1¾ lb. is the very best sugar producing beet if kept well covered. Green tops, showing lack of cultivation, were very common, and the analyses of the tops and bottoms prove conclusively that the amount of sugar, but especially the degree of purity, has been greatly lowered thereby.

Sugar.—Our average is nearly 14 per cent., much exceeded in some well-grown beets, and not attained by over-grown and poorly cared for samples. Some analyses available, taken from Washington report for 1890, may prove interesting for comparison, as the following :

Locality.	Sugar in Juice.	Purity.
Ontario	13.58	79.32
California	14.38	83.70
Kansas	10.85	72.64
Nebraska	12.55	58.30
Wisconsin	14.31	
Michigan	12.04	
Indiana	11.76	
France (large)	10.91 to 12.24	
France (small)	15.50 to 18.60	

Purity.—This is an improvement upon 1889 beets, but can still be further increased by attention to size and cultivation. The larger the beet the lower the purity, and the more out of ground the lower the purity.

General Conclusions by W. Skaife

The analyses are valuable evidences of the fact that sugar beets of fine quality may be grown in many parts of Ontario with proper care. Wherever the roots were well cultivated, both as regards keeping them below the ground and keeping the soil loose, the result was satisfactory. There are some instances also of roots sown in stony or very lumpy ground turning out well because of their being kept well below the surface. There are further instances of roots which have been well cared for, but have not succeeded owing to unsuitable soil or climate. But on the whole it may be said that the analyses would have averaged at least 14.5 per cent. sugar had the printed instructions been carefully followed, and much higher had the roots been grown in larger areas so as to have the benefit to be derived from close planting. This they lost through being, in the vast majority of instances, planted in but one or two rows. The richest beets received were grown by Mr. R, Willis, of Whitby. The finest and most regular lot, and those which would probably give the highest yield of sugar per acre, were from Mr. Thomas Ballantyne, of Stratford. The most remarkable beet was sent by Mr. Aaron Schantz, of Waterloo, being 4 lb. 8 oz. in weight and analysing 13.2 sugar, with 82.3 purity coefficient. The general appearance of the samples, together with their net weight and analyses, seems to point to the general conclusion that the yield per acre in the Province of Ontario would be higher than in Europe, while the percentage of sugar would be as high under intelligent cultivation.

During our investigation five samples of beets came in that had been grown from seed other than that imported for these experiments. We give an analysis of these in a separate table. The average is below that of our former table both in sugar and purity, though one sample (J. & R. Millar's) turned out very well.

SUGAR BEETS FROM OTHER SEED.

Grower.	Locality.	Seed.	Solids.	Sugar.	Purity.
O. E. Farm	Guelph	Dudgeon's white	16.0	11.5	71.8
"	"	" red.	16.0	12.5	78.1
"	"	Bruce's white	17.5	13.5	77.1
J. & R. Millar	"	Dudgeon's	18.7	15.5	82.3
Wm. Richmond	Dumfries	Red sugar beets	14.5	11.5	79.3
Average	....	....	16.54	12.90	77.9

The following extended tables contain the combined results of our work upon the separate samples, so far as we could identify them. One or two samples appear to have gone astray in shipment. We give the name of the grower or sender; the locality usually refers to the township; the nature of the soil is given where we have that information; "M" in fourth column means that the ground was manured for this crop; "A" means grown *much* above ground; "a" means grown slightly above ground; "B" means grown all below ground; "brix" refers to solids in juice.

GUELPH DISTRICT.

Name of Grower.	Locality.	Kind of Soil.	Manured or not.	Date of		No. of beets analysed.	Net Wt. of samples analysed.	Above or below ground.	Analyses of Juice.			Remarks.
				Sowing, May	Extraction, Oct.				Brix.	Sugar.	Purity.	
							lb.oz.					
James Laidlaw	....	....	....	....	....	4	4.12	B	17.25	15.00	86.8	Very good shape.
McBride Duncan	Guelph	....	....	....	....	10	6.13	a	17.00	14.00	82.3	Good shape but too small.
Aaron Schantz	Waterloo	Sandy loam	....	....	....	1	4.8	B	16.0	13 2	82.5	Very large, perfectly-shaped root.
"	"	"	....	....	....	5	8.11	B	18.25	15.4	84.3	Very good shape. Regular lot.
B. Schumacher	"	"	....	....	....	2	5.11	A	18.0	12.0	66.6	Large, well-shaped beets.
"	"	"	....	....	....	3	3.7	A	18.75	13.7	73.0	Fair shape.
David Betzner	"	"	M	....	....	6	7.7	B	17.75	14.7	82.8	Very fine, regular lot.
"	"	"	....	....	....	1	2.3	B	17.0	14.0	82.3	Very fine beet.
At. Werner	"	"	M	....	....	5	6.9	B	17.25	14.0	81.1	Very irregular shape.
"	"	"	....	....	....	1	3.13	B	16.0	12.0	75.0	Large round beet.
Peter Weaver	"	"	....	....	....	3	5.2	B	16.25	12.7	78.1	Very regular lot, but poor shape.
Brubacher and Schmitt	Woolwich	Clay loam	M	1st	21st	4	11.8	A	13.50	10.0	74.7	Large round beets.
"	"	Sandy loam	M	12th	15th	4	6.10	a	17.50	12.5	72.0	Fair shape.
"	"	"	....	....	....	3	4.8	B	17.75	14.2	80.0	"
W. Wenger	Normandy	....	....	....	....	2	6.9	a	17.0	12.0	70.5	Large well-shaped beets.
A. Hume	"	Sandy loam	....	18th	20th	2	2.6	a	17.0	14.0	82.3	Fair shape.
Thos. Todd	Galt	Clay loam	....	10th	23d	4	6.15	a	15.0	12.0	80.0	"
Thos. Ballantyne	Stratford	Clay	M	....	....	10	12.2	B	20.0	16.5	82.5	Very regular, perfect lot
Tilman Schantz	Berlin	....	....	....	....	3	7.6	a	18.25	14.75	80.8	Fair shape.
George Barrie	Dumfries	Clay loam	....	....	....	4	15.12	a	17.0	12.5	73.5	Large beets, poor shape.
"	"	"	....	....	....	4	6.10	....	16.4	13.0	79.2	Fair shape,
Alex. Scott	"	Light loam	M	1st	25th	4	5.4	B	19.0	16.0	84.2	Very good shape.
Wm. Richmond	"	Rich loam	M	1st	29th	3	5.4	B	18.0	14.5	80.5	Very fine beets.
David Goldie	"	Garden	....	1st	22d	6	13.0	B	15.5	11.75	76.1	Fair shape but too large.
Erskine Stewart	"	"	....	3d	22d	3	7.6	B	16.5	13.0	78.7	Fair shape.
James Lilie	Blenheim	Sandy loam	M	3d	22d	10	6.8	a	19.0	15.0	78.9	Good shape but very small.
?	Fergus	....	....	....	....	1	3.12	A	17.0	11.0	64.8	Very large and poorly grown.
Ont. Exp. Farm	Guelph	....	....	....	....	27	27.12	B	18.03	15.08	83.64	

WHITBY DISTRICT.

S. McConnachie	Pickering	Clay loam	M	25th.	11th	3	3.14	a	16.5	14.0	84.8	Three fine beets.
"	"	....	....	....	....	4	2.10	A	16.5	14.0	84.8	Small beets good shape,

G. Long	"	Clay loam	M	15th	11th	5	6.60	B	16.0	13.0	81.2	Good shape, rather rooty.
Hy. Westgate	"	Heavy clay	....	1st	11th	1	3.8	A	16.0	12.0	75.0	Very woody fibre, fair shape.
"	"	"	....	1st	11th	4	6.0	a	16.3	14.0	85.8	" "
S. H. Grierson	Whitby	....	....	....	....	3	3.10	B	19.5	15.8	81.0	Fine looking roots, but rather short.
"	"	....	....	....	....	2	2.8	A	16.5	13.0	78.6	Good shape.
Hon. J. Dryden	"	Black loam	....	1st	12th	4	6.8½	A	16.5	13.5	81.8	Good shape, but irregular in size.
Dr. Lick	"	....	....	12th	11th	12	12.3	a	15.0	11.0	73.3	Very irregular lot; largest, 2 lb. 9 oz.; smallest, 3 oz.; several hollow.
R. Willis	"	Clay loam	M	....	....	4	3.12	B	17.5	15.0	85.7	Good shape, but rather rooty; not ripe.
"	....	....	....	....	....	4	3.4	B	20.0	17.5	87.5	Very fine beets.
R. Lynde	....	Clay loam	M	30th	15th	5	8.11	a	16.5	12.0	72.7	Rounded, short beets.
Wm. Jeffrey	....	"	M	20th	15th	2	4.4	a	18.0	14.5	80.5	Fair shape.
"	....	....	....	20th	15th	2	2.4	B	20.0	17.0	85.0	Very fine beets.
David Briggs	....	....	....	....	....	6	5.6	B	19.25	14.17	76.3	Good shape, but too small.
C. C. Kellet	Port Perry	Sandy loam	M	1st	15th	3	9.6	a	15.25	12.2	80.0	Very large, round beets.
Wm. McGill	"	"	M	15th	13th	3	7.1	a	13.0	9.25	71.1	Badly shaped round beets.
"	"	"	M	15th	13th	4	5.8	a	18.0	13.2	73.2	Good shape.
Wm. Pearson	Reach	Clay loam	M	30th	11th	2	5.4	a	16.0	12.0	75.0	"
J. M. McClintock	"	Sandy loam	M	15th	11th	3	3.6	a	16.0	12.0	75.0	Very good shape.
J. Whitfield	"	Clay loam	....	1st	11th	6	16.12	B	16.5	12.0	72.7	Fair shape, but rooty.
F. & J. Manderson	"	"	M	30th	11th	10	4.8	a	21.0	13.25	63.0	Very small, unripe beets from 4 oz. upwards
"	"	"	M	30th	11th	2	3.4	B	16.0	11.25	70.3	Good shape, but unripe.
John Heard	"	"	M	15th	14th	3	4.0	a	18.25	14.7	80.5	Good shape.
"	"	"	M	15th	14th	2	3.4	B	18.0	14.7	81.6	"
James Cootes	Cartright	Sandy loam	M	30th	13th	4	3.13	B	19.28	16.2	84.1	Exceedingly long, irregular, rooty lot.
George Steele	"	"	M	20th	13th	5	6.0	a	20.5	16.5	80.4	Very regular, well shaped lot.
Wm. Steele	Reach	....	....	....	....	6	8.1	A	20.25	16.2	80.0	" "
M. Stonehouse	Scugog	Clay loam	M	1st	13th	6	6.0	a	17.75	14.2	80.2	Fair shape, but rooty.
"	"	....		....	....	8	2.9	a	20.5	16.7	83.5	Very small beets, like carrots.
John Whitfield	Reach	Clay loam	....	1st	11th	3	7.10	B	14.0	10.0	71.4	Fair shape.
"	"	"	....	....	11th	3	6.8	B	15.5	12.0	77.4	Better shape and size.

COBOURG DISTRICT.

Alfred Bell	Hamilton	Clay loam	....	22nd	14th	1	2.11	A	16.0	11.4	71.2	Large, hollow, round beet.
"	"	"	....	22nd	14th	2	2.13	a	17.5	12.5	71.4	Good shape.
John Bowman	"	Clay	M	15th	14th	2	5.0	a	17.25	12.1	70.1	Large beets, good shape.
"	"	....	M	15th	....	1	3.8	A				Good shape, but too large.
W. Riddel	"	Clay loam	M	June 20th	17th	6	6.11	B	19.0	16.0	84.2	Very regular, well shaped lot.
James Russel	"	Black clay	M	April 27th	8th	4	5.4	a	17.25	14.0	81.1	Fine regular lot.
W. J. Westington	"	Clay loam	M	May 1st	14th	1	3.0	A	19.25	15.4	80.0	Large, round beet.
"	"	"	....	1st	14th	2	4.2	A				Good shape.
Thos. Hoskins	Haldimand	Heavy clay	....	10th	17th	4	6.13	B	19.0	15.3	80.5	Very good shape.
W. F. Mulholland	"	Clay loam	M	14th	12th	3	7.9	B	18.0	14.4	80.0	Large, fine beets.
T. B. Carlaw	Percy	"	M	10th	30th	3	4.0	B	19.0	15.5	81.6	Grew one acre of roots, product calculated, 26.7 tons.
						2	3.14	B	18.0	15.0	83.3	
						3	4.0	B	17.5	15.5	88.5	

ESSEX DISTRICT.

Name of Grower.	Locality.	Kind of Soil.	Manured or not.	Date of Sowing, May.	Date of Extraction, Oct.	No. of beets analysed.	Net Wt. of samples analysed.	Above or below ground.	Analysis of Juice. Brix.	Analysis of Juice. Sugar.	Analysis of Juice. Purity.	Remarks.
							lb.oz.					
Billings & Wagstaff	Gosfield	Gravelly loam	....	4th	.....	3	3.14	B	11.0	11.0	73.3	Fair shape.
A. Wilson J. Walter R. Wigle R. Croft D. Hensam	Maidstone “	Rich loam “	....	14th 14th	4th 4th	4 1	4.4 2.11	B B	16.5 16.5	13.5 13.5	81.8 81.8	Good shape. Very fine shape.
Ellis	“	“	...	......	......	2	2.13½	B	17.5	13.5	77.2	Small, round beets.
David Hensam	“	“	M	......	......	2	1.6	B	18.0	14.5	80.1	Small, slender roots.
John Walters	Colchester	“	....	......	......	2	2.3	B	19.0	16.0	84.2	Small; very good shape.
Milne	“	“	....	......	......	2	2.5	B	17.5	13.8	78.9	Small, round beets.
A. McDonald	Ridgetown	Gravelly loam	M	27th	25th	2	8.3	A	16.0	11.5	71.8	Very long roots.

OAKVILLE DISTRICT.

Name of Grower.	Locality.	Kind of Soil.	Manured or not.	Date of Sowing, May.	Date of Extraction, Oct.	No. of beets analysed.	Net Wt. of samples analysed.	Above or below ground.	Analysis of Juice. Brix.	Analysis of Juice. Sugar.	Analysis of Juice. Purity.	Remarks.
John Wilson	Trafalgar	Sandy loam	M	1st	10th	2	4.6	a	18.5	14.2	76.7	Good shape.
“	“	“	....	1st	10th	1	3.0	A	16.5	13.2	80.0	Fair shape.
John Hilton	“	Clay loam	....	1st	10th	2	2.9	B	18.0	14.8	80.5	Very good shape.
“	“	“	....	1st	10th	1	2.3	B	18.25	14.7	80.5	Very perfect shape.
James Hill	“	Sandy loam	....	8th	10th	1	4.12	A	13.25	10.0	75.4	Very large beet.
“	“	“	....	8th	10th	2	3.6	B	16.5	14.1	84.8	Very fine beets.
“	“	“	....	8th	10th	2	1.5	B	16.25	14.0	86.1	
E. H. Robson	Waterdown	“	....	24th	10th	3	3.11	B	19.0	14.2	74.4	Well-shaped, regular lot.
Chas. Fothergill	Appleby	Clay loam	M	24th	10th	1	3.12	A	16.5	11.7	70.9	Large, well-shaped beet.
“	“	“	M	24th	10th	2	1.14	B	18.7	14.2	75.9	Well-shaped beets, but too small.
David Allen	N. Grimsby	....	....	......	......	3	5.7½	a	15.5	12.0	77.4	Fair shape.

BAY OF QUINTE DISTRICT.

Name of Grower.	Locality.	Kind of soil.	Manured or not.	Date of		No. of beets analysed.	Net weight of samples analysed.	Above or below ground.	Analyses of Juice.			Remarks.
				Sowing, May.	Extraction, Oct.				Brise.	Sugar.	Purity.	
Rathbun	Deseronto					6	7.7	B	18.5	15.0	81.0	Very regular, well shaped.
“	“					2	3.0	B	16.0	13.0	81.3	Fair shape.
C. Weese	Ameliasburg					2	5.7	A	15.25	11.0	72.1	Large, green tops.
“	“					2	5.2	B	19.00	15.8	83.1	Good shape, better than preceding.
W. R. Dempsey	“					2	3.11	A	17.5	13.0	74.3	Fair shape.
O. Hinch	Camden					2	8.10	B	15.0	11.0	73.3	Very large; poor shape.
“	“					2	3.14	B	17.5	14.0	80.0	Fair shape.
“	“					2	3.12	B	17.0	14.0	82.4	Best of the sample.

VARIOUS.

Name of Grower.	Locality.	Kind of soil.	Manured or not.	Sowing, May.	Extraction, Oct.	No. of beets analysed.	Net weight of samples analysed.	Above or below ground.	Brise.	Sugar.	Purity.	Remarks.
E. Berwick	Shelburne	Heavy clay				2	4.11	A	18.7	13.3	71.1	Good shape.
C. B. Hunt	South London.	“				10	5.6	B	17.0	14.0	82.3	Very good shape, but too small.
John Hunt	“	Clay loam				4	2.14	B	19.0	16.5	81.5	Small, well-formed beets.
James Leslie	Toronto			15th	26th	10	7.10	a	17.75	13.5	76.0	“ “
Rathbun	Deseronto					6	7.7	B	18.5	15.0	81.0	Very regular, well-shaped lot.
Wm. Cowan	Pickering					1	3.12½	A	15.8	11.0	68.9	
E. E. Burkinshaw	Gravenhurst	Garden, vegetable.		21st	29th	3	10.6	A	17.0	11.0	64.7	Very large, poor beets.
J. & J. Witchell	Vaughan					5	3.14	B	19.5	16.0	82.1	Fine beets.
“	“					4	3.9	B	18.0	15.0	83.3	“
“	“					3	5.8	B	16.8	13.5	80.3	Larger beets.
T. R. Wadsworth	Weston					3	4.0	a	14.0	10.8	77.1	Fair shape, above ground.
“	“					3	5.8	a	15.0	11.0	73.3	Larger size.
“	“					3	3.14	a	15.5	12.0	77.4	
J. & J. Neilson	Scarboro’					4	3.8	A	17.8	13.0	76.6	Large.
“	“					3	4.5	a	19.0	15.0	78.9	Larger, but better grown.
“	“					3	5.18	a	18.5	15.0	81.1	Better beets.
S. Page	Pelham					4	3.9	B	21.0	17.5	83.3	Small; little withered.
B. W. Murray	Toronto					4	6.4	a	17.3	14.0	80.9	
	Parkhill					4	18.4	A	14.0	9.5	67.8	Enormous, poorly grown.

REPORT OF THE METEOROLOGICAL OBSERVATIONS, LYSIMETERS, SOIL THERMOMETERS, DRAINAGE WATERS, Etc.

MADE AND COMPILED BY C. A. ZAVITZ, B.S.A., FOR THE CHEMICAL DEPARTMENT.

Observations on soil, temperature, drainage waters, etc., were taken this season as during the previous years. The instruments were placed in order on April 30th and a record of the readings made, commencing at May 1st and continuing until September 30th.

About the 1st of July a number of ground thermometers of different depths were unfortunately broken, and as these instruments are obtained from New York the vacancies could not be filled in time to be of much practical value during the present year.

No. 1 lysimeter was loam with sod, No. 2 loam with barley, No. 3 loam with bare fallow, No. 4 sand with barley, No. 5 clay with barley, and No. 6 loam with barley. On May 1st, 1889, a fertilizer containing nitrogen, phosphoric acid and potash was applied to each lysimeter at the rate of 600 lbs. per acre.

The following tables give the condensed summaries of the various observations taken during five summer months of 1890.

Rain gauge.—The rain which fell during the five months (May 1st to September 30th) as compared with that for the same period of the three previous years was as follows:

	1887.	1888.	1889.	1890.
	in.	in.	in.	in.
May	1.58	1.08	3.59	2.18
June	2.36	2.92	4.25	5.31
July	.61	2.21	2.67	1.44
August	2.71	2.16	1.92	1.74
September	1.52	1.55	1.04	.72
	8.78	9.92	13.47	11.39

Lysimeters.—The amounts of drainage water received from the lysimeters for each month was as follows:

May—Sod loam	5,140	cubic centimetres.
" Sand	8,877	"
June—Sod loam	8,140	"
" Barley loam	7,675	"
" Loam	4,055	"
" Sand	4,745	"
July—Fallow loam	3,915	"

Average for each thermometer for each month and for whole period.

Instruments.	May.	June.	July.	August.	September.	Average of the whole.
Barometer	28.752	28.852	28.893	28.916	28.955	28.
Attached thermometer	52.5	78.6	71.9	66.2	58.6	63.9
Temperature of air	50.7	65.4	68.2	62.8	55.4	60.5
Temperature, maximum	62.2	75.6	78.8	74.1	68.1	71.7
Temperature, minimum	40.2	56.2	54.2	51.6	43.9	49.2
Soil temperature 3 inches in sand	51.6	66.8	70.1	67.7	58.4	62.7
" 3 " clay	51.4	65.9	71.9	68.6	60.6	63.6
" 3 " loam	51.0	65.1	69.3	68.3	58.9	62.4
" 9 " clay	49.9	64.4	68.9	67.2	58.7	61.7
" 9 " loam	49.4	63.8	68.6	67.3	58.8	61.5

Greatest variation in temperature of each thermometer between two readings (*a*) Increase, (*b*) Decrease.

Situation of Thermometer.	Increase.				Decrease.			
	Date.	From.	To.	Variation.	Date.	From.	To.	Variation.
Temperature of air	Sept. 30.	34.1	69.3	35.2	June 26. Sept. 30.	83.0 69.3	62.0 48.3	21.
Thermometer in sand at depth of 3 inches....	Aug. 7.	59.2	86.4	27.2	May 26.	73.4	57.7	15.7
" clay " 3 "	Aug. 7.	59.0	91.3	32.3	Aug. 8.	94.6	72.8	21.8
" loam " 3 "	Aug. 7.	57.6	88.8	31.2	June 2.	77.2	60.6	16.6
" clay " 9 "	Aug. 15.	60.0	69.4	9.4	May 3.	65.8	51.2	14.6
" loam " 9 "	May 19.	42.0	51.7	9.7	July 29.	79.6	69.4	10.2

Tables of highest single readings of thermometers at different depths in three kinds of soil with date of same (for air also).

Situation of Thermometer.	Date of maximum temperature.			Maximum temperature.
	Month.	Day.	Hour.	
Temperature of air	August.	4	1 p.m.	88.1
Thermometer in sand at depth of 3 inches..................	"	1	1 p.m.	89.8
" clay " 3 "	July.	29	1 p.m.	95.5
" loam " 3 "	August.	8	1 p.m.	91.4
" clay " 9 "	"	4	9 p.m.	78.5
" loam " 9 "	"	3	9 p.m.	81.3

In addition to these investigations there has been the usual amount of correspondence with farmers and others in reference to matters of interest to them. On the whole the year's work has been both pleasant and, I trust, profitable, and has shown marked signs of development. With increased help and still greater scope for our work I trust the work of the year 1891 may prove still more pleasant and more profitable.

Through you to the Minister of Agriculture I beg to submit this report.

Yours respectfully,

C. C. JAMES,
Professor of Chemistry.

CHEMICAL LABORATORY,
ONTARIO AGRICULTURAL COLLEGE,
December 31st, 1890.

PART IV.

REPORT OF THE

PROFESSOR OF VETERINARY SCIENCE.

To the President of the Ontario Agricultural College:

SIR,—In submitting my annual report I am glad to be able to state that the health of the stock upon the farm has been good on the whole. Considering the amount of stock kept, we have had very little sickness and not many fatalities.

HORSES.

The horse stock has been unusually healthy, and beyond a few slight cases of colic and minor casualities there has been very little trouble.

For appearance sake at least, I would like to see the horses in rather higher flesh, and present a more vigorous appearance. Unfortunately, these animals labor under the same unfortunate circumstances that the horse stock upon most of the farms of Canada do. That is, that they have not nearly enough work during the winter to give them exercise, and what work they have comes by fits and starts, so that it would not be safe to give them full rations. All at once in the spring they are plunged into hard, heavy work, when they are not in a condition that fits them for it; so that they fail rapidly and never have a chance to recover, as they are worked to their fullest capacity until the season falls again, when their work is not sufficient to allow of their being got into good condition.

A WEAK FOAL.

A mare that works in the garden dropped a foal that was somewhat weak. Her supply of milk was small, and it did not appear to be properly constituted, as the foal took to scouring profusely, which we could not arrest, until we fed the young animal on cow's milk and with-held the mother's.

However, it did not gain in strength and could not get on its feet without being lifted, and soon became a victim to that bane of colt flesh called "Joint Ill," so that we considered it more humane to put it out of its suffering, as there seemed little chance of its ultimate recovery in the face of such discouraging complications.

The year before the same mare dropped a fine, strong, healthy foal that never ailed a day—a full sister to the one that died—and nearly every one that saw the mare prophesied that her foal would not do well, as she was so very fleshy. This year she was very decidedly lower in flesh, and as I have explained had ill-luck with her foal.

This is some evidence that a high state of flesh is not always to be assigned as a cause of ill-success in breeding; although there is no doubt that moderate condition is more favorable in the majority of instances

TAPE-WORMS IN LAMBS.

I explained in former reports losses that have resulted from the action of tape-worms upon the College lambs. Last spring we had a similar experience, although the mortality was kept within smaller limits, only some half-dozen lambs succumbing from the ravages of the worms, as we were enabled from the benefit of past experience to take prompt action in the administration of medicine to cause their expulsion. As I explained in a former report, Oil of Male Shield Fern is the agent used, and we give from ten to twenty-five drops at a dose according to the size of the lambs.

They should not be allowed any solid food for twelve hours, and should be encouraged to drink linseed tea prior to getting the Shield Fern. We used to give raw linseed oil in preparing for the dose, and although the laxative action produced by it was an advantage in aiding the action of the Sheild Fern, still we found it had an extremely nauseating effect, causing much coughing and depression, and I intend in the future to with-hold it, and rely upon starving and the linseed tea.

The medicine should be mixed with a wineglassful of linseed tea and poured down. If the expulsion of worms has not been as free as it should have been, the dose may be repeated in twelve hours.

Since I previously reported upon this subject I have made some inquiries as to the existence of this trouble in other parts of the continent, and find that its occurrence is by no means rare. I have also come in contact with it on numerous occasions in different parts within a radius of ten miles from Guelph. It is regretable that helminthologists have not yet discovered the life history of this worm—*Tœnia expansa*—as we might then be in a position to prevent its ravages upon lambs.

I do not know of any cases where injury has been done to adult sheep by these worms.

It is considered by helminthologists that tape-worms in order to complete their life history, or in other words to develop from eggs to mature tape-worms, must pass through some other form of animal life before they can reach their mature stage, and infest the animal which they are naturally inclined to attack. For instance, after the eggs leave the segments of the tape-worms, that are expelled from lambs, these eggs are not simply taken up again by lambs and developed into worms in the lambs bowels, for if they were so taken up, they would never complete their life history in these hosts, but would be expelled without maturing. So it has been determined, that these worms in their undeveloped stages or larval form, have to enter some other living host, in order to proceed with their development. Now, if this intermediary bearer or host can be discovered and destroyed, then the development of these worms and their consequent ability to do harm is arrested. Acting upon the theory that some slug or mollusc might be the intermediary bearer, we determined to try a heavy dressing of salt on the pasture that the lambs were put upon two years ago last spring ; as salt has been found to be destructive to these low forms of animal life, as in the case of the mollusc that harbors the immature stage of the liver fluke that causes " Bot " in sheep, in the old country. However, it had no marked influence in checking the development of the worms, for they again attacked the lambs that year.

AN EXPERIMENT.

Last autumn a pure-bred Ayrshire cow seven years old was purchased and brought to the farm. Towards the spring, her attendant finding she was not doing well, requested me to examine her, which I did. I made up my mind at once that she was the victim of " tuberculosis " and had her immediately isolated for further observation. As she was milking at the time, and as there was an available calf, out of a Durham grade cow by a pure-bred Polled-Angus bull, it occurred to me that it would be a good opportunity to test the transmissibility of tuberculosis, through the medium of the milk.

It is a point, that has by no means been satisfactorily settled by observers. Authorities are almost unanimous in the belief that where the tubercular deposit involves the udder, there is the utmost danger to susceptible individuals consuming the milk from that udder; but many hold the view that if the mammary glands are not involved in the deposit, that the danger is slight. In this case the udder was perfectly healthy, hence the opportunity for an experiment was very favourable.

Our patient rapidly declined, in fact from the very first, she presented the symptoms of a typical case of gallopping consumption. We kept her for about one month, allowing the calf to suck her during this time. As she began to get pretty weak, we resolved to destroy her and make a *post mortem* for the benefit of the students. Upon opening her we found very extensive deposits of tubercles, both in the chest and abdomen, in fact almost all the organs in these cavities were seriously involved.

The calf was put away by himself and fairly well fed and housed for seven months, when we killed and opened him. During this time he appeared healthy and throve fairly well, his appetite being good, and there was no cough.

I examined him, and took his temperature occasionally, but found nothing abnormal. Upon opening him, however, we found widespread deposits of incipient tubercles. Both pleuræ were dotted all over with small clusters of tubercles, and in the abdomen the liver was spotted externally in a like manner, and also there was a good crop on the sheet of membrane—mesentery—that envelops the bowels, and suspends them to the root of the abdomen.

In fact it was astonishing to observe the extent of the deposits, after having witnessed the apparently healthy state of the young animal during life.

It was consistent, however, with my past observations, that if the tubercular deposits are not sufficiently extensive to interfere with the functions of important organs, there is no appreciable evidence of ill-health resulting from their presence. In order to make this experiment as complete as it might have been made, this calf should have been kept separate, to avoid the chance of infection through the medium of the air, or food of the foster-mother, of which they would both partake from the same box. Unfortunately, however, this calf could not be got to drink milk from a pail, and if he had been let into the cow's box twice a day to suck, he would have been subjected to the same danger from the breath of the cow or from her sputum though in a less degree.

As a matter of fact, I think we are justified in assuming, that the milk was the medium of transmission in this case.

Although recognising that there is some foundation for the theory of infection through the medium of the air, where healthy cattle are kept with tubercular ones, and also from feeding out of the same manger, still concluding from my own experience, I am of the opinion that the danger is slight when compared with that of consuming the milk from a tubercular subject.

Both the sire and dam of the calf are said to be healthy.

It is pretty generally recognised now that human and bovine "tuberculosis" are one and the same disease; hence the necessity for caution in using the milk from a cow, in which there is any suspicion of "tuberculosis," for it would appear that it is just as liable to be transmitted to the human being as to young bovines in this way.

Respectfully submitted,

F. C. GRENSIDE.

PART V.

REPORT OF THE FOREMAN

OF THE

HORTICULTURAL DEPARTMENT.

Ontario Agricultural College,
December 31st, 1890.

To the President of the Ontario Agricultural College:—

Sir,—At the close of another year it becomes my duty to show, in some form, the amount of garden produce supplied to the college throughout the year. In doing so it is unnecessary for me to make anything in the way of a report, as I have no doubt Prof. Panton, as heretofore, will do ample justice to the department in that way. I would just say that notwithstanding a favourable season for vegetation and growth generally, through climatic and other causes beyond our control, the fruit crop was poor, both in quantity and sample; but culinary vegetables, of which we had all the leading varieties, were good and abundant in their seasons, sufficient to meet all the requirements of the college, and, as usual, a supply stored for winter use, also a small surplus sold and added to revenue, as shown in the following statement.

Supplied to the College during the year:

January.

Cabbage, 9¼ doz. at 65 cts	$ 6 01¼	
Celery, 16½ doz. at 60 cts	9 90	
Onions, 1½ bush. at $1.50	2 25	
Parsnips, 3¼ bush. at 40 cts	1 30	
Carrots, 3 bush at 30 cts	90	
Beets, ½ bush. at 35 cts	17½	
Turnips, 1 bush at 20 cts	20	
Herbs, 5 bunches at 5cts	25	
Sundries	45	
		$21 43¾

February.

Beets, 1 bush. at 35 cts	35	
Parsnips, 5 bush. at 40 cts	2 00	
Carrots, 5¼ bush. at 30 cts	1 57½	
Onions, 3 bush. at $1.50	4 50	
Cabbage, 11 doz. at 65 cts	7 15	
Celery, 1 doz. at 60 cts	60	
Herbs, 14 bunches at 5 cts	70	
Sundries	60	
		17 47½

March.

Carrots, 6 bush. at 30 cts	$1 80	
Beets, ½ bush. at 35 cts	17½	
Parsnips, 7¼ bush. at 45 cts	3 26¼	
Onions, 3½ bush. at $1.50	4 87½	
Cabbages, 10 doz, at 65 cts	6 50	
Herbs, 6 bunches at 5 cts	30	
Sundries	30	
		$17 21¼

April.

Carrots, 7 bush. at 30 cts	2 10	
Beets, 1½ bush. at 35 cts	52½	
Parsnips, 7¼ bush. at 45 cts	3 26¼	
Shallots, ½ bush. at $1.50	75	
Cabbage, 6½ doz. at 70 cts	4 55	
Sundries	60	
		11 78¾

May.

Lettuce, 13 bush. at 60 cts	7 80	
Parsnips, 4 bush. at 35 cts	1 80	
Rhubarb, 7½ bush. at 70 cts	5 25	
Carrots, 3 bush. at 30 cts	90	
Asparagus, 360 bunches at 4cts	14 40	
Sundries	75	
		30 90

June.

Rhubarb, 15½ bush. at 60 cts	9 30	
Lettuce, 8 bush. at 50 cts	4 00	
Spinach, 17 bush. at 40 cts	6 80	
Peas, ½ bush. at $1	50	
Asparagus, 940 bunches at 4 cts	37 60	
Onions, 130 bunches at 5 cts	6 50	
Gooseberries, 42 qts. at 6 cts	2 52	
Strawberries, 73 boxes at 7 cts	5 11	
Sundries	30	
		72 63

July.

Lettuce, 14 bush. at 40 cts	5 60	
Peas, 8¾ bush. at $1	8 75	
Rhubarb, 7¾ bush. at 50 cts	3 87½	
Spinach, 2 bush. at 40 cts	80	
Potatoes, 6½ bush. at $1.50	9 75	
Asparagus, 320 bunches at 4 cts	12 80	
Onions, 61 bunches at 5 cts	3 05	
Beets, 47 bunches at 5 cts	2 35	
Carrots, 58 bunches at 5 cts	2 90	
Strawberries, 217 boxes at 6 cts	13 02	
Raspberries, 197 boxes at 7 cts	13 79	
Cherries, 8 boxes at 6 cts	48	
Currants, 145 boxes at 6 cts	8 70	
Currants, black, 21 qts. at 12 cts	2 52	
Gooseberries, 156 qts. at 6 cts	9 36	
Beans, 80 qts. at 5 cts	4 00	
Herbs, etc	30	
		102 04½

August.

Potatoes, 19 bush. at 70 cts	$13 30	
Lettuce, 3¾ bush. at 30 cts	1 12½	
Beets, 1¼ bush. at 30 cts	37½	
Peas, 3½ bush. at $1	3 50	
Rhubarb, 10½ bush. at 50 cts	5 25	
Carrots, 1 bush. at 40 cts	40	
Apples, hand-picked, 15 bush. at 60 cts	9 00	
Apples, fallen, 1½ bush. at 30 cts	45	
Tomatoes, 6 bush. at 75 cts	4 50	
Cabbages, 6½ doz. at 50 cts	3 25	
Corn, 44 doz. at 8 cts	3 52	
Celery, 7½ doz. at 50 cts	3 75	
Vegetable marrow, 1½ doz. at 50 cts	75	
Cucumbers, 20½ doz. at 10 cts	2 05	
Cucumbers, pickling, 2,705, per 100, 20 cts	5 41	
Beans, 48 qts. at 5 cts	2 40	
Raspberries, 21 boxes at 7 cts	1 47	
Onions, 15 bunches at 5 cts	75	
Herbs, 7 bunches at 5 cts.	35	
Sundries	20	
		$61 80

September.

Potatoes, 11½ bush. at 40 cts.	4 60	
Apples, picked, 5¼ bush. at 50 cts	2 62½	
" fallen, 2 bush. at 25 cts	50	
" crab, 4¼ bush. at 60 cts	2 55	
Tomatoes, 17½ bush. at 60 cts	10 50	
" green, 8 bush. at 50 cts	4 00	
Lettuce, ½ bush at 40 cts	20	
Onions, ½ bush at $1	50	
Pears, 2 bush. at 80 cts	1 60	
Corn, 21 doz. at 8 cts	1 68	
Cabbage, 5¼ doz. at 50 cts.	2 62½	
Cauliflower, 5½ doz. at 75 cts	4 12½	
Celery, 6¾ doz. at 50 cts	3 37½	
Cucumbers, 1½ doz. at 10 cts	15	
Peppers, 2 doz. at 12 cts	24	
Plums, 400 qts. at 4 cts	20 00	
Grapes, 250 lb. at 5 cts	10 00	
Grapes, 147 lb. at 3 cts	4 41	
Melons, 15 at 5 cts	75	
Squash, 6 at 5 cts	30	
Herbs, etc	25	
		74 98

October.

Potatoes, 113 bush. at 40 cts	45 20	
Turnips, 7 bush. at 15 cts	1 05	
Onions, 3¾ bush. at 90 cts	3 37½	
Tomatoe, 1¼ bush. at 70 cts	87½	
Apples, good, 59 bush. at 50 cts	29 50	
" inferior, 2 bush. at 25 cts	50	
Beets, 2 bush. at 30 cts	60	
Carrots, 1¾ bush. at 30 cts	52½	
Parsnips, 2 bush. at 40 cts	80	
Celery, 23 doz. at 50 cts	11 50	

Corn, 14 doz. at 8 cts	$1 12	
Cabbages, 10¾ doz. at 50 cts	5 37½	
Cauliflower, 12½ doz. at 70 cts.	8 75	
Melons, 142 at 4 cts	6 48	
Citrons, 100 at 6 cts	6 00	
Vegetable Marrow, 250 at 5 cts	12 50	
Bos. M. Squash, 28 at 6 cts	1 68	
Herbs, 7 bunches at 5 cts	35	
Sundries	45	
		$136 63
November.		
Onions, 2 bush. at $1	2 00	
Turnips, 5¾ bush. at 15 cts	86¼	
Carrots, 2¼ bush. at 30 cts	67½	
Parsnips, 3¾ bush. at 40 cts	1 50	
Beets, 1½ bush. at 35 cts	52½	
Artichokes, 1 bush. at $1	1 00	
Celery, 19½ doz. at 60 cts	11 70	
Cabbage, 4¾ doz. at 50 cts.	2 37½	
Cauliflowers, 4 doz. at 70 cts.	2 80	
Cabbage, pickling, 50 at 5 cts	2 50	
Herbs, 13 bunches at 5 cts.	65	
Sundries	45	
		27 03¾
December.		
Onions, 1¼ bush. at $1	1 25	
Salsify, 1½ bush. at $1	1 50	
Parsnips, 2½ bush. at 40 cts.	1 00	
Carrots, 1 bush. at 30 cts	30	
Turnips, 3½ bush. at 15 cts	52½	
Beets, ½ bush. at 35 cts	17½	
Cabbage, 6½ doz. at 50 cts.	3 12½	
Celery, 15½ doz. at 60 cts.	9 30	
Herbs, 10 bunches at 5 cts	50	
Sundries	30	
		17 97½
Total supplied to College at current rates		$591 91
Sold for Cash		79 55

Your obedient servant,

JAMES FORSYTH.

December 31st, 1890.

PART VI.

REPORT OF THE PHYSICIAN.

To the Honorable JOHN DRYDEN,
Minister of Agriculture:

SIR,—I have the honour of presenting to you my Annual Report.

Owing to the almost simultaneous appearance of an epidemic of measles and la grippe, after the Christmas holiday of eignteen hundred and eighty-nine, we could not prevent the spread of those diseases, as no provision had been made for isolating the patients that were under treatment.

Several of the students who never had measles before had to run the course of both diseases before making final recovery.

I am glad to be able to report that, according to instructions given by you, two comfortable rooms with their appurtenances are almost ready for use.

During the rest of the year, we have had nothing of an unusual character occur.

The college is in a good sanitary conditition.

I have the honor to be, Sir,
Your obedient servant,

E. W. McGUIRE, M.D.,
College Physician.

December 31st, 1890.

PART VII.

REPORT OF THE

PROFESSOR OF AGRICULTURE.

Ontario Agriculture College and Experimental Farm,
31st December, 1890.

To the President:

Sir,—I have the honor of herewith submitting my report for the year of 1889 for the respective departments of this institution under my more immediate supervision. These include in addition to my own report, those of Mr. C. A. Zavitz, assistant in the experimental departments, and Mr. J. E. Storey, the farm foreman.

The year 1890 was not more favorable to successful farm management in Ontario than the year 1889, owing to the unusual amount of the rainfall during the months preceding the reaping of the harvest. So excessive was this rainfall in the neighborhood of Guelph, that for days in succession during the month of May and the first half of June, no work could be done on the land in the line of cultivation. The growth resulting from so great an amount of moisture in the soil was excessive, and the promise of an enormous yield on the approach of harvest was most cheering, but the hot days of July during the formative period of young grain in the ear soon rendered it apparent that this hope was illusive.

The year, however, has on the whole been a very successful one, as will be apparent to all who can find time to examine the financial statement on another page. From this statement it is manifest that the farm proper has more than paid its way during the year 1890. It was publicly announced by the Hon. Chas. Drury, during his term of office, that he thought the farm proper separate from the work of an experimental nature should not be a burden to the farmers of this Province, but that on the other hand it should at least produce revenue enough to cover the expenditure. During the year 1889 it was simply useless to attempt to realize this object, because of the confusion in management resulting from the burning of the buildings. The effort was made, however, during the year now drawing to a close, with the result which has already been mentioned.

While I am free to admit that the mere making of the farm proper pay its way, is not by an means the most important object of its existence or that is sought in its management, it is of much importance to the farmers of this country to know that it is managed with a due regard to economy. The most convincing evidence of economical management is to be found in a balance sheet on the right side. I do not know that it is the mind of the department to have the accounts so kept in future that the gain or loss from the farm proper may be known from year to year. If this should be decided upon, however, it is my firm conviction that good management would show a balance sheet on the right side every year, or if not every year, the average of gains would more than overbalance the average of losses.

The improvements undertaken during the year relate chiefly to the repairing of fences, the re-making of roads bordering upon and within the farm, the destruction of weeds and the removal and reconstruction of a sheep barn.

Improvement of Roads bordering on the Farm.

In the month of August the portion of the road between the Townships of Guelph and Puslinch which was left without gravel last year was completed. The construction of this road is given in the report for 1889, page 103. As soon as the ground was dry enough in the spring, mixed grasses were sown along the side of this road on the entire space between the gravel and the fence on either side. It grew luxuriantly and was twice cut with the mower. This not only prevented any weeds from going to seed, but added much to the pleasing appearance of the road.

The Brock road running in front of the college grounds was taken in hand in the spring as soon as the grain had been sown. The fences on its sides were removed and the sod turned over from the head ridge in the bordering fields to the travelled portion of the road. The ploughing was repeated three times on some portions and four times on others, and the ground was harrowed and levelled between the ploughings. The bordering ditches were then made by first marking them out with the plough, and after this by using the scraper in the grading. The road-bed was made 38 feet wide between the outmost edges of the ditches. The slope from the centre outward was made just enough to drain the water off readily, and not so violent in any part as to hinder the use of the mower in cutting grass or weeds.

Before any ploughing was done the stones were gathered from the sides of the road where they had been deposited sometime, by some one, in numerous heaps in the years that are gone, and were drawn away to be put in the bottom of another road. It seems to be the practice with some road-masters in caring for gravel roads to throw aside into the grasses upon the borders all the stones that work up through the gravel, instead of breaking them or drawing them entirely away. This practice renders the borders very unsightly. It is not fair to the owner of the property bordering upon the road. It was from this source, however, that a number of the stones came which were removed from this road. There is very much public travel on this road and this accounts for the more than average width of the road-bed decided upon, and for the further fact that when the gravel was put on it was spread to the width of eighteen feet. This allows two teams to pass ordinarily without leaving the gravel.

The gravel was applied as soon as the grading was completed. It was spread by Mr. Squirrel this year again and with an evenness fully equal to that evidenced in this work the previous year. In the centre of the road the depth would be fully six to seven inches and less toward the sides. No stones were drawn in the gravel larger than one's fist and but few half so large. At least this was the aim, and even these were continually raked forward and covered as the work proceeded. After the gravel had been put on it was twice raked toward the centre and twice rolled with a heavy roller, insomuch that it became very smooth and solid by freezing up time. When the teams were unloading the gravel they were required to go forward a short distance and turn in one place. This prevented the scattering of the gravel where it was not wanted and the making of an unsightly job, while the time lost in consequence was scarcely appreciable.

The county bore a part of the expense of drawing the gravel. Another portion was borne by the Government, and a portion of the work was done by the farm teams. The whole of the labor of ploughing and leveling the sides of the road was done by the farm teams and farm help, as was also the removal of the stones and the grading of the road. It was also done without any special grant for the purpose. Such times were chosen for doing it as would not interfere seriously with other farm work. The borders between the fences and the travelled portion will be sown with grass in the spring.

The grading done late in the autumn of 1889 on the private road on the north side of the Brock road was much marred by the excessive rains of early spring, insomuch that it was determined to re-summer fallow the borders again. This was done and also whatever additional grading was required. Posts were also set eight feet apart and one foot from the outer edge of the ditches which border on the roadway. On a portion of this line of posts the fence is completed. It consists of a bottom board 1x1½ inches, planed, and a top piece 2x4 also of pine and planed. This piece is nailed upon the side of the posts. The top side of this scantling is three feet from the ground. The bottom piece is let into the posts one inch, the top piece 1½ inches. The space between these two pieces is filled with wire netting. The object of this inner fence is to protect the trees which, in the spring, are to be planted along the borders.

The private road on the south side of the Brock road was also taken in hand. After the whole road had been ploughed, the road-bed was scraped out to the width of nine feet and to the depth of say ten inches. This cavity was then filled with small stones to the depth of six to eight inches, deeper in the centre and slightly sloping toward the sides. These stones were gathered from the fence corners of the fields and also from portions of the road itself, where they had been strewn about in objectless accumulations. The work on this road stands thus, and will be pushed to completion another season. In all these improvements the rule has been followed thus far to do no more than can be accomplished by the staff of farm workers, and by the farm teams when the labor of these is available, without in any other way neglecting the other farm work. Thus it is that the ordinary farmer carries on his work if it is to be economically done, and I see no reason why this rule should be departed from here. It can never be said regarding the improvements on the farm that they are completed so long as the principle of decay is operative, hence the widsom on the part of the progressive farmer, of continuing these from year to year.

THE DESTRUCTION OF WEEDS.

The war against the multitudinous forms of vagrant weed-life which infested the farm and also the bordering highways, was renewed with the coming of the springtime, but the strong effort in this direction was made after the middle of June, and more especially in the months of August, and early in September. But little, comparatively, can be done in ordinary farming in early spring, in destroying weeds, other than what is accomplished by the usual modes of cultivation. The thistle crop was not so abundant after the scourging of the previous year. This may also be said of the wild flax, the ragweed, the mustard, the blue weed, the sow thistle and the burdock. The ox-eye daisy gave but little trouble after the treatment described in the report of last year. The couch grass has been given one more year of life. Hitherto it has been entrenched mainly behind the protection of meadow land, and so has been thus far unmolested.

The means adopted for the destruction of weeds were similar to those of last year, and included (1) hand pulling, (2) the use of the spud, (3) the growth of hoed crops, and (4) autumn cultivation.

The *hand* pulling is specially applicable to the eradication of mustard and wild flax. It is only possible, however, when these exist in limited quantities in the crops, as otherwise the cost of the operation would be too much. It can be best done in conjunction with spudding, when other weeds requiring this are present. Wild flax is usually present only in meadows and fields sown to autumn grains, as rye or winter wheat, and unless pulled shortly after blossoming, the seed will shed abundantly. Wild flax is one of the most dangerous weeds now found in this province, and one of the most difficult to dislodge. Mustard is more troublesome, as is generally known, in spring sown grains, and so long as it is allowed in any degree to ripen on a farm, that farm will never be entirely free from it.

Spudding is applicable to the destruction of nearly every form of weed life found in meadows, grain crops, or pastures. Its utility is subject to the same restrictions as hand pulling, depending largely on the numbers in which the weeds are present. When they are very numerous, some other mode of eradication must be rssorted to. It will be found specially serviceable when fields have once been virtually cleaned, in keeping them in this condition. When this plan is adopted, any of the more troublesome forms of weed life are detected at the outset, and so do not easily get a foothold. I am fully impressed with the conviction that when once a farm is made fairly clean, it cannot be kept so without resorting to this plan, and that in no other form can labor be expended with this object in view that will give so good a return for the outlay. The grain fields were all gone over, spud in hand. The pastures were gone over twice, including the unbroken land enclosed along with the forests. The number of hours employed in this way during the summer of 1890 was 498½ or 49 4.5 days of one person's labor.

Our great reliance for the eradication of weeds on this farm is the growing of *hoed crops.* Where these will grow well, I do not see any necessity for the use of the bare fallow. We are cleaning this farm without resorting to its use at all. We had 108 acres in hoed crops the past summer. Of this amount, 54 acres were rape, 19 acres corn, 20 acres field roots, and 7 acres potatoes. All of this was badly infested with thistles and other forms of weed life. It would not be incorrect to say that it is clean now, so far as this can usually be said of any piece of land. In addition to the work done by the horse hoe on the hoed crop, it was gone over twice at least with the hand hoe, so that by harvest time no weeds could be found upon it at all approaching the blossoming stage.

Of all the crops which we grow, as aids in the destruction of weeds, rape is with us the favorite, and the potato crop is least in favor. With the latter, the tops die so soon, and cultivation ceases at a period so early, that the thistles at least put in an appearance again, and regain much of that hold upon the soil, of which the earlier cultivation had deprived them. When the rape is grown in conjunction with rye and properly cared for, the weeds have small chance of a long lease of life. The rye is sown in autumn, and in the spring is cut for the silo, or pastured as may be desired. The ground is then ploughed about the first of June, or a little later, and the rape is sown about the last week in June. The turning over of the ground in June, and the after cultivation during a dry period of summer is most efficacious in destroying the weeds. The rank growth of the rape leaves so excludes the light after the cultivation ceases, that there is small chance for the growth of weeds. If any weeds are allowed to go to seed along the line of the row, this is a very weak point in the cultivation. The weak point, usually, in all cultivation of hoed crops is usually discernible in the later stages of growth. If they were gone over once or twice with the hand hoe after all horse labor ceases, and all stray weeds and thistles cut off, the farmer would be abundantly remunerated for his outlay. The time occupied in this work when the preceding cultivation has been of the right sort, need not be more than one day for three or four acres.

The cheapest labor factor in the destruction of weeds is probably that of *Autumn cultivation*, and it is certainly one of the most effective. It consists in ploughing the land lightly as soon as possible after harvest, where a crop of grain or grass has been grown, and on which a spring crop is to be sown the following year. The gang plough will answer very well where thistles are not plentiful. Where they are plentiful, the ordinary plough with a clean cutting share should be used, and the ploughing should not only be light, but most carefully and thoroughly done. When fresh weeds appear plentifully on this upturned soil, it will well repay the labor to run over it with the harrow some weeks before it is finally turned over for the crop, when the freezing time is approaching. All the land we had which required this treatment received it.

I desire here to say to the farmers of this province, I see no reason why we should not have clean farms in all Ontario. It remains with each farmer to say that his farm will be clean, and so it shall be. The method which allows the farm generally to accumulate the elements of weed life and which then makes a dash at one field by means of the bare fallow will never prove completely successful. There must be unremitting vigilance all along the line and through all the years. The objection has already been raised that it is comparatively easy for us to clean a farm, and to keep it clean, where we have so much available labor. I answer, we account for all labor employed on the farm, and pay for it from the same.

THE REMOVAL OF THE SHEEP BARN.

The sheep barn, which was removed and remodelled, stood directly in the line of the private road which runs past the creamery barn. It was old and infirm, and bordered very closely on the realms of unsightliness and dilapidation. This building, which had no sills, was taken down and re-erected on the southerly side of the yard connected with the creamery barn. A good foundation of stones was placed under it, and a commodious loft put into it for the storing of hay and bedding. It has ample yard room in front.

The uses to which this sheep barn is to be devoted are three-fold. First, it will provide shelter in time of autumnal storms for lambs that may be pasturing on rape or otherwise. Second, it will answer well for the wintering of sheep belonging to the farm, owing to the roominess of the building and of the yards in front; and third, in the summer season it will provide accommodation for any kind of stock when this may be necessary.

SPECIAL CROPS GROWN UPON THE FARM DURING 1890.

The special crops grown upon the Farm during 1890 consisted of tares or vetches. rye for pasture and soiling, rape, and sugar beets. The term *special* here is applied to these crops for the reason that they are not usually grown by the Ontario farmer, and they have all been grown by us for purposes of experiment.

Tares or Vetches.—This crop was grown with the following objects in view, viz.:—(1) To ascertain whether the crop is a paying one in this locality, or whether it can be made so. (2) To ascertain whether they can be so grown that no trouble will arise with the succeeding crop from the prolonged presence of the tares in the soil. (3) Whether they may not be grown in Ontario in sufficient quantities to reduce the cost to the farmer when purchasing seed The growth of tares in conjunction with oats, or with oats and peas for soiling purposes, is rapidly on the increase in this country, but the farmer has hitherto paid about two dollars per bushel for his seed. When I mention this I do not in any way intend to reflect upon the seedsmen of this province. I affirm, however, that it is more than the farmer can well afford to pay for his tares. If the price of the seed could be brought down to one dollar per bushel, the growth of tares for soiling purposes would be very much extended. As one factor in a soiling crop they are very useful, and the growth of soiling crops is happily coming more and more into favor with the farmers every year.

The attempt this year could not be called a success by any means. The tares were sown on a loamy soil, and on a fall-ploughed piece of land where oats had grown the previous year. They were sown with the drill May 1st, and at the rate of 1½ bushel per acre. They grew with great rapidity during the following weeks of very showery weather. On June 25th they presented a beautiful appearance, but closer inspection made manifest a rankness, and at the same time a sappiness and tenderness of straw that were ominous. About July 1st the whole plot was covered with purple blossoms, and in its attractiveness was full of deceitful promise. During the early days of July, which were intensely warm, the rankest portions of the field withered like the gourd. Other portions of lightest growth retained the dark shade of luxuriant growth, and intermediate portions took on a lighter tinge, indicating considerable derangement in the processes of nutrition. The crop evidently ripened prematurely and yielded only from five to six bushels per acre. These brought when sold, $1.50 in the Toronto market. Pease in the same field and sown about the same time, yielded twenty-five bushels per acre. The tares, when removed, were followed by a crop of rye, which is being grown for the silo, and which will be followed by a crop of rape.

Rye for Pasturing and for the Silo.—Twenty-six acres of rye were sown in the autumn of 1889 to produce pasture. The open winter injured the portions of the field containing a humus soil, by the constant succession of freezings and thawings. The pasturing commenced soon after the rye had made a good start in the spring, and continued until June 10th, when the field was ploughed for rape. It was pastured with both cattle and sheep, and the results were fairly satisfactory.

Twenty acres of rye were also sown in field No. 1 in the autumn of 1889 with the object of cutting it with the binder, curing one-half of the rye in the shock and putting the other half into the silo. It was our intention to use the cured portion as hay, that is, to run it through the cutting box and mix with other food as we now use the hay which is given to the cattle. The open winter also injured this crop somewhat in the low parts where black soil was plentiful. The excessive rains in June rendered it impossible to cut the rye at the proper stage for curing, and before a team could do the work of cutting at all in the low parts without poaching, the crop had passed even the best stage at which it should go into the silo. It was cut at length about the middle of June, run through a cutting box and put into the silo. It had no other covering in the silo than from six to twelve inches of cut straw. When the rye was removed from this field the ground was at once ploughed for rape, which was sown during the first days of July.

The silo was opened about August 1st and the stock kept inside were given a portion of the rye along with a sprinkling of meal intermixed with it. The animals did not take kindly to it for the first two or three days, but eventually became very fond of it, and so far as we could judge did well upon it. As we had anticipated, a portion of the rye adjoining the walls of the silo was injured because of the over woody stage at which it was put into the silo. All the rest of it was sweet and good.

The fields chosen for the rye were both overrun with thistles, and to clean them was one principal object in view when the rye was sown. When followed by a crop of rape that is sufficiently cared for, this object can be attained in finest form. A crop of rye and a crop of rape can both be secured from the land, and the land will at the same time be as effectively cleaned as though it had been summer fallowed. It will also be somewhat richer than when the rye was sown if both rye and rape are eaten off upon the land, as both these crops draw their stores largely from the atmosphere and from the subsoil.

Forty acres of rye were sown during the first week of September. It is the intention to use this also as a cleaning crop in conjunction with rape. Some of it will be cured to use as fodder if the season is suitable and a part will be put in the silo. The amount sown per acre was two and one-half bushels, and it was sown with a drill. It should be remembered, however, that this mode of cleaning land is only suitable for soils which are adapted to the successful growing of rape.

Rape for Pasturage.—As intimated in the paragraph relating to rye, forty-six acres of rape were grown after the rye, viz., twenty-six acres after rye pastured until June 10th and twenty acres after rye cut about the middle of June and put into the silo. The ground in the first instance was ploughed, commencing June 17th, and in the second commencing June 28th. The former field was sown during the last week in June and the latter during the first week in July. In the first instance the ground was sufficiently damp to bring up the rape almost at once. In one portion of the field a heavy rain which fell immediately after the seed was sown so impacted the ground that the seed was slow in coming up, and this portion of the crop never equalled the other in strength and vitality. In the second instance the weather had become so dry by the time the seed was sown that the rape only came up at first in the damp portions, although the sowing followed close upon the drilling and the precaution had been taken to roll the drills with a heavy roller immediately after the sowing of the seed. A light shower of rain which fell three weeks later brought up the seed in the other portions of the field. This gave the crop an uneven appearance for a time, but before many weeks the rapid growth, which followed soon obliterated all indications of unevenness.

A third plot was sown still later. It consisted of eight acres. This field was being fitted up for experimental purposes. It sustained a rank growth of thistles. These were permitted to grow until they were beginning to blossom. They were then turned under, the ground harrowed and drilled, and sown to rape July 31st. This field had received a liberal coating of manure before the ploughing, in view of the experimental crops to be grown upon it later. The weather was very dry when this field was ploughed, worked down and sown, which was good for the destruction of the thistles but bad for the growth of the rape. It did not germinate for some weeks. A shower which fell during the last week in August caused quick germination and rapid growth. This field soon became covered with a strong mass of green leaves, but evidently was quite inferior to the earlier sown both in the amount of nutriment furnished and in its suitability for maintaining a good condition of system in the lambs. It neither fed them so long acre for acre, nor did they gain in flesh nearly so rapidly upon it as when feeding upon the earlier sown rape. The first hard frosts had the effect of so softening the stalks that they presented an appearance that may almost be termed one of wilting.

All three fields were drilled with the double mould board plough with marker attached. The drills were not made high and were twenty-three inches apart. One pound of seed was used to the acre, and in the earlier sown field a less quantity. The variety sown was the Dwarf Essex. The horse hoes commenced work soon after the rape had shot up into the rough leaf, and they were kept going at short intervals until the leaves from the drills which bordered upon each other had met. These fields were twice gone over with the hand hoe and all weeds removed from the line of the drills. The first time of doing this hand hoeing took one day of one man for every two acres, and the second one day of one man for every three acres.

By the 10th of September these fields, especially the two first sown, presented a beautiful appearance. There was one mass of luxuriant foliage from side to side in both without either bare ground or weed in sight. In field No. 1 the drills were made up to the travelled part of the Brock road in front of the College grounds. The reasons for doing this will be understood if reference is made to the cultivation of these road sides described on page 90. It was distinctly observable that the rape was strongest on the road side, evidencing its fondness for a soil rich in the humus formed by the decaying grass roots.

In field No. 11 the ground was gang-ploughed after the fall wheat had been removed and was sown to rape broadcast at the rate of three pounds of seed to the acre. This also was pastured, but I would not like to say without another trial whether the return was much in excess of the outlay. Of this I have no doubt, however, that if a meadow, which is in any event to be broken up, be ploughed just after the crop is removed and sown broadcast with rape that the land will be much better employed than if engaged in perfecting ragweed.

The fifty-four acres of rape in fields Nos. 16, 1 and 17 afforded a very large amount of pasture. On September 15th 18 head of steers, two and three years old, were put upon a portion of the rape and were given food from no other source until November 5th, a period of fifty-one days. They were only allowed to remain on it for an hour or two at a time at first, and ultimately as long as they cared to remain except at night when they were driven off to an adjoining pasture. They were not stabled until November 5th as the autumn was mild. They were then put in at night and allowed to pasture on the rape during the day until November 21st, which would be about equivalent to eight more full days' pasturage upon the rape. On October 4th 344 sheep were put upon the rape and remained on until 1st December, or for fifty-seven days. On October 18th 145 more sheep were put upon the rape and remained on it until 1st December, or for forty-three days. On October 23rd 100 of the lambs were shorn and were then only allowed on the rape during the day and in fair weather for thirty-seven days. If we assume that the pasture of these lambs after shearing would cover seventeen full days we must then deduct the pasture of 100 lambs for twenty days in making the final computation of the amount of pasture furnished. Now on the supposition that one steer requires as much as eight lambs, since they were all large animals, we get the following as the amount of pasture furnished by the rape. Very much to our regret what would cover fully seven acres of the ground was uneaten when the winter came, but as stated before, through no neglect of ours. The statement stands thus :—

Pasture of 18 steers for 59 days equal to the pasture of one lamb for......	8,496	days.
" 344 lambs for 57 " " " "	19,608	"
" 145 sheep for 43 " " " "	6,235	"
	32,215	"
Less pasture of 100 lambs for 20 days or of one lamb for	2,000	"
	30,215	"

This is equivalent to saying that the forty-seven acres of rape eaten bare, kept 503 lambs for an average of sixty days or two months. Each acre of the rape, therefore, pastured nearly eleven lambs for two months. The lambs, however, received a small grain ration of oats per day for a little more than half the time they were on the rape. This was during the latter portion of the time and the quantity used did not exceed one-half pint per day. The above computation does not take into account the time when odd lambs were lost by death and for which no deduction of pasturage is made.

Sugar Beets.—One acre was measured off in field No. 5, and prepared for growing sugar beets as early in the spring as the season would permit this work to be done properly. We did not know last autumn that we in common with a number of the farmers in many parts of Ontario would be asked to grow sugar beets this year, with a view to ascertain the capabilities of the country in this respect, or we would have prepared the ground differently.

The aspect of the plot chosen was high, near the summit of one of the largest swells on the farm. The soil was a loam, rather gravelly in texture, and it lies on a subsoil of gravel, rather near the surface to favor the retention of moisture in a dry time. The manure on hand was not sufficiently decomposed for the purpose, and was not applied until the spring. Lower land, a milder loam, and a subsoil farther from the surface would have been more suitable, as would also the autumn application of farm-yard manure. At the late hour, however, at which it was determined to try the experiment, the most available location was chosen, weather and all other influences considered.

The land was ploughed in the fall and again in the spring. It was then harrowed and drilled, the drills being made 18 inches apart, or as near to this distance as the work could be done with the ploughs which were available. The seed was sown as directed by those engaged in promoting the industry at the rate of 16 pounds per acre. The plot was horse hoed four times, hand hoed once, and gone over again later to completely remove all weeds.

The cutworm so far preyed upon the crop that the blank spaces in the drills would comprise from one-third to one-fourth of the whole. A dry spell in August further checked the growth of the crop, as also that of the mangel crop adjoining, insomuch that the latter only gave a return of 300 bushels, or 9 tons per acre.

The harvesting commenced October 4th. The entire crop was weighed, a portion of it washed and trimmed, that is, freed from the rootlets and earth, and, from the results, the estimate for the whole was made. These results were as follows :—

Total weight of uncleaned and untrimmed roots..20,504 ℔s., or 10.252 tons.
Total weight cleaned and trimmed..............19,073 ℔s., or 9.536 tons.
Loss in weight in the washing and trimming, nearly 7 per cent.

The average per cent. of sugar obtained by actual chemical analysis from samples taken from all portions of the field was 15.08.

The value of the crop at $4.25 per ton for the beets when delivered at the factory would be $40.52. The price mentioned is the value per ton, which the promoters of the industry propose to pay for beets of this quality when delivered. This sum varies with the percentage of sugar which the crop yields.

The value of the mangel crop grown side by side with the beets, if put at 8 cents per bushel in the root cellar was $24.00 per acre, leaving a margin of $16.52 cents in favor of the beets, less the difference in the outlay for labor. This difference is mainly one arising from the longer time required in hand-hoeing and thinning the sugar beets, and also in handling them when taken up. It should not be more than $5.00 per acre. The yield of turnips per acre in the same field was 440 bushels, which at 8 cents per bushel would be worth $35.20. On the same basis of computation as that used in comparing the mangel crop with that of the sugar beets this turnip crop would be worth about the same as the beet crop. The yield of the three crops was very low, much lower than the average, but it is surely my duty to state, with equal candor, the failures as well as the successes of our work on this farm.

The yield of the outside row of the plot furnishes material for careful reflection. It bordered upon an open space about three feet in width, where the cultivation was deeper than that given the ground between the drills of the beets. This row yielded at the rate of about 20 tons per acre, and the percentage of sugar realized was 11.04. The large yield of this row as compared with the rest of the plot was probably caused by the deeper cultivation on one side of it. If this view is correct, it is evident that if the rows are to be not more than 16 to 18 inches apart, our cultivators at present in use are not well adapted to the purpose.

About the 1st of July an intruder appeared in the form of a grub, which preyed upon the leaves without disturbing either of the outer surfaces. It caused some of the leaves to appear somewhat blighted in a portion of their length, and no doubt injured the growth of the roots. The blighted appearance of the leaves continued for several weeks.

As this question is to the fore at present, and as the cultivation of sugar beets is as yet but little understood in this country, it may not be amiss to append some observations in reference to the methods adopted in growing sugar beets.

The most favorable climates in the world for the growth of sugar beets are such as may be denominated " wine climates," and which are therefore a shade milder than those of the larger portions of Ontario. The important requisites as to climate are moderate temperatures, with a sufficiency of moisture during the germinating period, followed by a season of warmth and moisture such as we usually possess in the months of May and June. As the season advances weather rather dry and sunny is desirable, such as we usually have in August and September, It is during this latter period that saccharification is most rapid in the roots. It cannot be said, therefore, that our climate is the very best in the world for the growth of the sugar beet. That it is well adapted, however, to produce sugar beets both in sufficient quantities to the acre, and with a sufficiently high yield of sugar, has been set at rest by the actual trials conducted in the province during the year. No less than 240 samples of seed were last spring distributed through nearly all parts of the province by the promoters of the industry to enable the farmers to conduct these trials. From the beets thus grown no fewer than 117 samples were collected and analyzed at this college by Prof. James, M.A. and Wilfred Skaife, B.A. Sc., of Montreal. The average percentage of sugar obtained was 13.58, which is higher than the average obtained from beets grown in several of the states of the American union most favorable to the industry, and is quite equal to the averages obtained in France and Germany. It may be proper also to mention that the diffusion of more knowledge regarding the methods of cultivation would secure a still higher percentage of sugar. In the analysis referred to above, the respective averages of sugar obtained from the upper or uncovered portion of well grown beets, and the lower portion were 15.5 and 16.6 per cent., and with those poorly grown, 11.4 and 13.6 per cent. The percentages of purity in the first instance were 82.7 and 83.0, and in the second 69.9 and 77.2.

In respect to the comparative yields per acre the statements are conflicting, and in nearly all of them the estimates are probably too high, as in almost every instance they are based upon the figures obtained from the growth of a single row or of a very small plot, which will give results too high for average acre plots, as will be manifest from what has been said in reference to the outside row of our own plot, and to which special reference has already been made. Nearly all the estimated average yields are over 20 tons per acre, which is manifestly too high. It is possible, however, that it may yet be demonstrated that good cultivation will give an average of 15 tons per acre, which would be quite as high as the averages of the foremost of the continental beet growing countries.

The most suitable soils are those possessing a mild, moist loam, deep and easy of cultivation. Where a stratum of loam marl is found lying underneath them, and lower still a subsoil of sand, the conditions are considered very favorable. Such soils have an absorptive power in a very marked degree. Depth of soil is absolutely necessary to success, as the beet roots take their nourishment very largely from the lower portions of the surface soil. A porous subsoil is also essential, as unless the ground drains readily of itself or is thoroughly underdrained the soil remains too cold in the early part of the season, and capillarity is too much checked at a later period. Of clay soils those only which are mild and loamy answer well. Strong clays are not good and the same may be said of sandy soils unless those which may be denominated loamy sands.

The soils must be rich in themselves or they will require to be heavily manured. The sugar beet does not possess the power in a marked degree of gathering food from the soil, hence if the latter is not rich it is not likely to succeed.

Barn-yard manures should be applied in the fall, as when put on in the spring they induce too large a growth of leaf and this retards the ripening process. Manures that are highly nitrogenous produce a similar result. Manure made from horses is best, and that from sheep is the least useful, as its presence increases the amount of salts in the beets.

It is considered good practice to use artificial fertilizers in conjunction with barn-yard manures. When the former are used prominence should be given to those rich in phosphoric acid. When thus applied about 10 tons of fairly well decomposed farm-yard manure may be applied per acre in the autumn, and in the spring 80 to 100 lbs. superphosphate of lime and 80 to 100 lbs. Chili saltpetre. When the barn-yard manure is used alone, or when the commercial fertilizers just named only are used, the respective amounts may be doubled. Farm-yard manure should not be applied oftener than once in five years. When farm-yard manure is not to be had and nitrogen is wanted, it may be applied in the form of nitrate of soda, and in quantities varying from 100 to 150 pounds per acre. When potash is required it may be applied in the form of kainite, and at the rate of 200 to 400 lbs. per acre. The quantities will, of course, vary to suit the requirements of each particular case.

The cultivation is similar in many respects to that required for mangels. It is imperative that the ground be deeply ploughed in the autumn. Beets will not push their way down into a hard soil, and the portion grown above ground is comparatively useless. The sowing should be early, as soon indeed as the ground is in fine condition. There is difficulty in making the drills close enough with our ordinary ploughs and the cultivators now in use cannot get down deeply enough between the drills. It is probable that it will be found here, as in France, that the proper way will be to drill on the level, with a drill that will sow several rows at once and to cultivate with a two-horse cultivator that will also cultivate several rows at once. The cultivating had better commence soon after the rough leaf is well developed and the more frequently it can be done the better are the results likely to be. The thinning and first hand-hoeing should be done just after the first cultivating. The plants are to be left about 8 inches apart in the row. The last cultivating should be done by an implement made for the purpose, which draws the earth around the plants so that the exposed portion of the roots is covered. The lifting is done by an instrument made for the purpose, which is drawn by horses.

The largest roots that may be grown are usually lower in the percentage of sugar which they yield than smaller ones. The medium sized beet weighing from 1 to 1½ or 1¾ pounds, which is regularly formed and tapering, usually gives the best results. When grown in rows wide apart and with wide distances in the row they attain too large a size to yield a high percentage of sugar. When thinned to the distance of eight inches in the row, when the rows are 18 inches apart, the yield would be 21½ tons, providing the beets averaged 1 pound each. It is difficult, however, to grow a field without some blanks, which will reduce the yield proportionately.

The estimates for the cost of production per acre varied, but few of them, however, exceeded $35.00, and most of them were under this sum. They include the rental of land, and the cost of the proportion of the manure used by the crop. I incline to the opinion that this estimate is too low, where all the labor of men and teams is to be hired if the drawing to the factory is also included.

The Season and the Crops.

The early part of the season was unusually wet as has been already intimated. In the amount of the rainfall until about July 20th it is probably without precedent during recent years. A first result of this was the great difficulty in carrying on field operations, a second was the submerging of the grain in some parts, but in this respect we did not suffer very much, a third was the tendency in the ground to impact when dry weather came at length, and a fourth was the difficulty in removing weeds from amongst the grain, owing to its constantly wet condition.

The adverse influences of the weather, however, told most severely on the filling of the grain. The growth of straw was most luxuriant, and almost up to the time of ripening the casual observer would have looked for an extraordinary yield. This remark applies to all kinds of grain grown upon the farm and in all the grain fields. The weather of the ripening period was warm, but not perhaps more than ordinarily so. But the straw was unusually succulent, and when the ripening stage was reached the straight upright lean look of the heads told its own tale before the binder was set to work at all.

There was some rust, more or less of it indeed on nearly all the grain, but not nearly so much as during the preceding year. And yet the shortage in the grain, except in the experimental plots, was much more acre per acre than during the previous year. By referring to the report of the farm foreman we find 12½ acres of barley in field No. 3 yielding 19½ bus. per acre. In field No. 7 the crop of oats from twenty acres was 17 bus. per acre, where 50 bus. per acre might justly have been looked for before the earing out period. In field No. 11 the yield of Egyptian oats was 16 bus. per acre, with straw sufficient for 70 bus., and the 13 acres of fall wheat, which by the straw indications should have yielded 25 bus. per acre gave an actual return of less than 7 bus. per acre. The straw was not lodged to any great extent, and this fact renders the poor yield all the more remarkable.

It is not pleasant to state these facts, but they are unfortunately too true and will go far to explain why large quantities of grain have to be purchased to keep the heavy stock going which it is necessary for educational and other reasons to keep upon the farm. It will also serve to show in one sense at least the difficulty which is encountered in so managing the farm that the balance sheet will be on the right side.

The hay and pea crops were all that could be desired. The potato crop suffered the most from the wet, and mainly from lack of under drainage. The rape crop and root crops were on the whole very good, although the mangels and turnips were both, comparatively speaking, small crops.

The exceedingly wet weather in the later autumn again retarded operations in the fields and on the roads most seriously, but notwithstanding when winter came the autumn work was well advanced.

THE EXPERIMENTAL WORK OF 1890.

This work may be spoken of under two heads, viz., Field Experiments and Live Stock Experiments. These were conducted on a scale far in advance of anything hitherto attempted here, if we consider the character and extent of the work. The same difficulties were encountered this year again which have been emphasized in previous reports. These relate to sudden variations in soil and subsoil, low aspect of the land and rust, and these conditions have been further intensified during the last two years by undue moisture during the growing period.

We hope for better things, however, in future. During the past season field No. 18, northward from the grapery was fitted up for the reception of the grain plots. It is one of the most elevated fields upon the farm and one of the most uniform in the character of both soil and subsoil. We hope by this change to be able to keep rust influences somewhat at bay and to get better yields of grain. This field was manured in the early part of the season, and rape was then cultivated upon it to make it clean

FIELD EXPERIMENTS.

These experiments include the following :—

1. 54 varieties of barley including 69 plots ; 54 varieties of spring wheat including 54 plots ; 92 varieties of oats including 103 plots ; 27 varieties of peas including 27 plots ; and 53 varieties of fall wheat including 55 plots. Some of these varieties were failures as was to be expected, and are not reported upon. (For further particulars see pages 101 and 155).

2. The testing of oats, wheat and barley, sown at different dates to ascertain the extent of the advantages of early sowing. (See pages 101 and 154).

3. The testing of different quantities of seed in growing barley, to ascertain the relative merits of thick and thin sowing. For several reasons this experiment was not deemed sufficiently satisfactory to report upon this year.

4. The growing of 11 varieties of carrots, 29 varieties of mangels and 48 of turnips, to ascertain their relative value for feeding purposes, quantity and quality considered. (See pages 112 and 174).

5. The growing of some 28 varieties of potatoes, to determine their profitableness relatively. (See pages 112 and 173).

6. The growing of a large number of plots of rape which include several experiments. These relate to the advantages of thick and thin sowing, broadcasting or in drills and cultivation in drills or on the level. (See pages 113 and 178).

7. The growing of different varieties of millet, which were tested both with and without fertilisers. The objects sought were the determining of the relative value of the millets, and also of the fertilisers. The low location of the plots, which of necessity had to be chosen for this experiment, in connection with the wetness of the season, rendered the experiment of no practical value.

8. The growing of 12 plots of grasses which include as many varieties, and which have been laid down for eight years. The object is to test their permanency. (See page 181).

9. The growing of a number of plots of mixed grasses and clovers which were sown in 1883, 1884, 1886 and 1887 respectively, with the view also of testing their permanency. (See page 181).

10. The growing of several plots of various grasses of spring and fall seeding, to ascertain the relative advantage or disadvantage from sowing such grasses at these seasons respectively. (See page 182).

11. The growing of several plots of lucerne sown in various ways, as in drills and broadcast, to ascertain if cultivation will repay the labor and also to determine the proper quantities of seed to sow.

12. The growing of a number of plots of corn, both broadcast and in drills, with different quantities of seed, to ascertain the relative values of these respective modes of cultivation. (See page 185).

13. The conducting of tests with artificial fertilisers in growing oats and rape respectively. The object here was to ascertain the intrinsic value of these fertilisers, and in the case of the oats to ascertain their value as compared with barnyard manure. (See pages 184, 179).

14. The growing of an acre of sugar beets to ascertain the yield per acre, and the percentage of sugar that may be obtained from beets grown on soil similar to that of this farm. (See page 196).

15. The growing of tares to ascertain (*a*) the yield, (*b*) whether this crop can be grown with material advantage here, and (*c*) whether it can be so grown that the tares will not prove troublesome in the crops that come after. (See page 93).

16. The growing of a number of cereals in plots varying from ⅛ of an acre to 5 acres. These include nearly fifty different varieties of grain. About 50 acres were devoted to grain experiments in plots of one acre and less, and fully one hundred acres of the crop grown was for experimental purposes. The objects in view were (*a*) to confirm the accuracy of the small tests with the more important kinds of grain, (*b*) to secure larger amounts of seeds from the more valuable sorts, and (*c*) to increase the revenue derived from the farm by devoting much of it to uses so important.

The labor arising from the extension of this work is very considerable, and in part accounts for the large outlay in conducting the work of the farm. The plots require first to be measured. Great care is necessary in sowing them. The separating borders require to be kept clean throughout the season. The labor of harvesting is tedious. The threshing which is done in the open air is also a labored work, as the machine requires to be thoroughly cleaned after each plot has been threshed. The same applies to the winnowing of the grain. (For further particulars see pp. 155).

The report of Mr. Zavitz on the plots of spring grains grown in the experimental department, commencing with page 152, furnishes a very complete summary of the work done in this line. The following bulletin, issued on the subject about the end of the year, brings out the points which are of most vital importance to the farmer :—

BULLETIN LVIII.

EXPERIMENTS WITH SPRING GRAINS IN 1890.

The tendency with every variety of grain that has ever been produced is to deteriorate when grown long upon the same kind of soil and in the same locality. The necessity, therefore, for the introduction of varieties from other countries or from distant parts of the same country, and of producing varieties which are entirely new, will always exist. In this fact we find a perpetual argument for the existence of experimental farms.

The object of this bulletin is to make known to our farmers (1) the varieties of spring grains which grew most successfully at this farm during the summer of 1890 ; and (2) important comparisons relating to all the varieties grown. These comparisons relate (1) to yield, weight of grain, weight of straw, and date of maturing in all the varieties mentioned ; (2) to color, and other peculiarities of growth, to the structure and weight of the grains, to the relative percentage of the hull, and to proneness to injury from rust in some of the varieties named ; (3) to the number of varieties tested from different countries and the average yields obtained from them, and (4) to six-rowed and two-rowed barleys respectively, with and without hulls.

The information thus given has been obtained from tests made with 54 varieties of barley, 54 varieties of spring wheat, 20 varieties of pease, and 92 varieties of oats. The different varieties of each kind of grain were grown under similar conditions as to soil and treatment. They were sown side by side upon plots containing one-fiftieth of an acre each in the case of the barleys, one-sixtieth of an acre in that of the pease, and one one-hundredth of an acre in that of the spring wheat and oats. In the tables given below the yields are based upon the standard weights obtained from the measured bushel, and from samples that were thoroughly cleaned.

BARLEY.—The information given in Table I. relates to the ten varieties of barley which gave the highest yields in 1889 and 1890. The average yield is given for the two years. The varieties grown in 1889 were sown April 15th, and those grown in 1890 April 19th.

TABLE I.

Name of variety.	Kind.	Country whence obtained.	Yield per acre.	Weight of grain per bushel.	Weight of straw per acre.	Number of grains per ounce.	Date of maturing.
			bush.	lbs.	tons.		
Cheyne	2-rowed	Germany	48.5	53½	2.18	670	6th August.
Chevalier	"	France	47.5	52⅓	1.13	726	7th "
Mandschurei	6-rowed	Russia	47.3	51¼	1.70	755	31st July.
Oderbrucher	"	Germany	45.8	54¼	1.42	743	1st August.
Empress	2-rowed	England	45.4	51¼	1.92	720	6th "
Early Black	6-rowed	France	44.8	51	1.61	591	31st July.
Scotch Improved	"	Ontario	44.4	52	1.27	805	31st "
Selected Chevalier	2-rowed	England	43.0	50½	1.75	758	7th August.
Common	6-rowed	Ontario	41.7	54½	1.29	819	31st July.
Golden Drop	2-rowed	Germany	41.4	53½	1.84	646	5th August.

In addition to these the following varieties went over 40 bushels per acre, viz.: Hallett's Pedigree (Germany), Italian Rice (Germany), and Imperial (France). Carter's Prize Prolific is not included in the above list as with us the average yield for the two years was 32.3 bushels per acre on the small plots, and the return this year for the acre plot was 31½ bushels, and the weight of the crop of 1890 was 52 pounds per bushel. It appears, however, to have done much better in many other localities.

SPRING WHEAT.—The information given in Table II. relates to seven varieties of spring wheat which gave the highest yields in 1890. They were sown April 25th.

TABLE II.

Name of variety.	Country whence obtained.	Yield per acre.	Weight of grain per bushel.	Weight of straw per acre.	Rust tendency.	Date of maturing.
		bush.	lbs.	tons.		
Herison Bearded	France	27.2	64	1.90	Very slight	8th August.
White Fyfe	Ontario	26.9	60	1.39	Considerable	14th "
Bart. Trimenia	Greece	26.3	64	1.06	Very slight	10th "
White Russian	Ontario	22.1	57¼	1.91	Considerable	11th "
Red Fern	Ontario	21.9	60	1.76	Slight	11th "
Pringle's Champion	Germany	21.2	59½	1.90	Very slight	12th "
Holben's Improved	Germany	20.4	58½	1.70	Medium	14th "

The Herison Bearded has been tested for two years, and was last year ahead of all the foreign varieties, and also of all the Canadian varieties except the Wild Goose. It is a fairly strong grower, stands up well, and is almost entirely free from rust. The head is short but compact and is bearded ; the chaff is red and the berry is rather small but plump, and is also red.

The Bart Trimenia, though a good yielder and weighs well, is rather coarse in the berry.

Pease.—The information given in Table III. relates to five varieties of pease which gave the highest yields in 1890. They were sown April 24th.

Table III.

Name of variety.	Country whence obtained.	Yield per acre.	Weight per bushel.	Weight of straw per acre.	Date of maturing.
		bush.	lbs.	tons.	
Sweet Jessie..................	England...........	31.16	62¾	0.82	11th August.
Early Race-horse	"	29.29	64¼	1.06	10th "
Mummy..................	Ontario............	28.60	65¾	1.26	11th "
Early Britain.................	England......... ..	28.37	60	0.57	11th "
White Wonder..	New Zealand	27.67	64¾	0.80	5th "

Oats.—The information given in Table IV. relates to the ten varieties of oats which gave the highest yields for 1889 and 1890. The average yields are given for the two years. They were sown on April 22nd of each year.

Table IV.

Name of variety.	Country whence obtained.	Yield per acre.	Weight of grain per bushel.	Yield of straw per acre.	Tendency to rust.	Character of head.	Color of grain.	Number of grains per gram.	Percentage of hull.	Date of maturing.
		bus.	lbs.	tons						
Joanette Black	France ..	71.7	34½	2.7	Slight	Spreading	Pale black.	51	27.0	9th July.
Houdan Black......	"	69.1	34¾	2.0	Slight to medium.	"	"	66	28.9	9th "
Chenailles..........	"	69.1	34⅝	2.9	Slight	"	Black ..	55	26.0	8th "
Oderbrucher........	Germany	66.6	31½	2.3	"	"	White..	41	33.5	6th "
Danebrog	"	64.0	32	2.7	"	"	" ..	41½	30.0	9th "
Siberian............	France ..	63.6	34¾	2.1	Medium to slight.	"	" ..	51	30.0	2nd "
Black Etampes......	"	62.3	36½	2.5	Slight	"	Black ..	41	26.8	9th "
Probsteier..........	Germany	61.8	33	2.6	Slight to medium.	"	White..	44	30.8	6th "
Pringle's Progress ..	Ontario..	61.8	28½	2.7	Slight	"	" ..	39	35.0	4th "
Improved Besthorne.	Germany	61.8	32¼	1.9	Considerable .	"	Yellow .	45	30.6	9th "

It will be observed that all but one of these best varieties are foreign, although 21 varieties of Canadian oats were grown, including nearly all the old standard varieties. The average yield of the ten varieties given in the table was 64.1 bushels per acre, while the average yield of the ten poorest was 27.8 bushels, that is, the ten good varieties yielded 230 per cent. more than the ten poor ones. It is also worthy of note that these good varieties all possess the spreading head.

The Joanette Black, Houdan Black, Chenailles and Black Etampes are very much alike in all essential characteristics. The straw is strong and of medium height, or a little less. It stands exceptionally well, is not coarse, and is almost entirely free from rust. They are somewhat inclined to shell easily when ripe, as is often the case with valuable grains. They also yield well and weigh well, and have a small percentage of hull as compared with the kernel.

AVERAGE YIELDS OF BARLEYS.

The average yields of barleys grown from seed obtained in the five countries named are as follows:—

Germany	17 varieties	Yield per acre,	35.6 bushels.
England	13 "	"	42.2 "
France	7 "	"	37.6 "
Ontario	4 "	"	38.2 "
Sweden	4 "	"	33.5 "

AVERAGE YIELDS OF OATS.

The average yields of oats grown from seed obtained in the seven countries named are given below:—

Ontario	21 varieties	Yield per acre,	35.6 bushels.
France	19 "	"	47.8 "
Germany	15 "	"	48.0 "
Scotland	13 "	"	41.8 "
England	9 "	"	41.8 "
Russia	5 "	"	42.7 "
Australia	4 "	"	32.6 "

TWO-ROWED AND SIX-ROWED BARLEY.

Table No. 5 gives information regarding the 54 varieties of barley grown with and without hulls as to yields, weight of grain per bushel, and the size of the grains.

TABLE V.

Character of head.	With or without hulls.	Number of varieties.	Average yield of grain per acre per bushel.	Average weight of grain per bushel.	Number of grains per ounce.
Six-rowed	With hulls	9	37.45	51.22	772.2
	Without hulls	5	31.00	61.80	848.2
Two rowed	With hulls	39	37.84	51.87	685.1
	Without hulls	1	21.90	63.00	478.0

It should be borne in mind (1) that the average yields obtained in growing these grains is more than the average is likely to prove in the country generally, for they were all grown under very favorable conditions. (2) That similar weights are not likely to be realized unless the grains are thoroughly cleaned, and (3) that the facts in this bulletin will be valuable mainly in localities with soil and climatic conditions similar to those here. The soil where these plots were grown may be termed a mild clay loam, containing a considerable quantity of humus, and it is somewhat low in aspect. The average mean temperature for the past four years for the five months commencing with May 1st, has been 61°, 43′, F.

Conclusions.—The following conclusions may safely be drawn from the experiments which have been sủmmarized as above:—

(1) It is highly probable that some of the foreign varieties of barley named in the table will be found to give higher yields than the varieties now grown in Ontario when they shall become more generally introduced.

(2) It is probable that in some localities the Herison bearded spring wheat will be found to be an improvement on many of the varieties that are now grown.

(3) From present indications based upon the trial given in the table and upon a trial on a larger scale upon the farm, the Mummy pea is likely to become a generally useful variety, although the straw is not highly valued for feeding purposes, owing to its coarse habit of growth.

(4) That four varieties of French oats, viz., the Joanette Black, the Houdan Black, the Chenailles and the Black Etampes are likely to prove of much value to the farmers of this province, as they possess in common and in a marked degree nearly all the most valuable characteristics of oats. Their color will, however, discount them in the estimation of the oatmeal millers. The behavior of the Oderbrucher, also a white variety from Germany, has been such as to entitle it to the favorable consideration of the farmers. It has been most favorably recommended by the oatmeal millers.

(5) Judging from the experience of the past two years, the English barleys give on the whole the best results, but some fair growing and yielding varieties come from Germany and France. In reference to oats, the French varieties should be placed first, all things considered, although some kinds from Germany do nearly as well.

(6) The average yields obtained from the two-rowed and six-rowed varieties of barley are not far different, nor is there much difference in the average weights of the two classes.

(7) The average returns from the foreign varieties are in a majority of instances superior to those from the old standard varieties.

Additional Notes Regarding Spring Cereal Grains.

Average Yields of Barleys.—A complete list of the average yield of barleys for 1890 and the countries which furnished them is given below:—

Germany	17	varieties	Yield per acre,	35.6	bushels
England	13	"	"	42.2	"
France	7	"	"	37.6	"
Ontario	4	"	"	38.2	"
Sweden	4	"	"	33.5	"
New Zealand	2	"	"	47.8	"
Russia	2	"	"	33.9	"
Scotland	2	"	"	29.1	"
Australia	1	"	"	8.9	"
Italy	1	"	"	38.8	"
Hungary	1	"	"	51.0	"

One of the New Zealand varieties gave a yield of 44.3 bushels per acre. It is the thirteenth in the order of yield. The weight per bushel was 54.62 lbs. It was one of the finest samples grown.

The Early Black, one of the ten best yielding varieties, was badly affected with smut during both years of its growth.

While the average yield per acre of the five best varieties of barley grown was 46.9 bushels per acre, that of the five poorest varieties was only 23.6 bushels.

Barleys Grown in Large Plots.—Amongst those were the common Ontario and Carter's Prize Prolific, which were grown in acre plots, and the yields from them, were as follows :—

Common Ontario, 39 bushels per acre.

Carter's Prize Prolific, 31½ bushels per acre. (See page 170.)

Average Yields of Oats.—This enumeration gives a complete summary of the varieties of oats grown from the different countries and the comparative yields obtained from them :—

Ontario..........	21	varieties........	Yield per acre,	44.8 bushels.
France	19	"	"	47.8 "
Germany	15	"	"	48.0 "
Scotland	13	"	"	41.8 "
England	9	"	"	41.8 "
Russia	5	"	"	42.7 "
Australia	4	"	"	32.6 "
Sweden	1	"	"	39.0 "
Hungary	1	"	"	39.7 "
California	1	"	"	42.7 "

White and Black Oats Compared.—This table gives the particulars of comparison between the white and black oats grown in these experiments in the most important essentials :—

Color of grain.	No. of varieties.	Average period of maturing.	Rust tendency.	Percentage of hull.	No. of grains per gram.	Yield of straw per acre.	Average weight of grain.	Average yield per acre.
						tons.	lbs.	bus.
White	22	7th July.	2.32	35.32	39.06	2.30	34.92	48.25
Black	70	10th July.	2.26	34.70	51.38	2.60	31.66	45.59
Mean averages............	92	....	2.28	35.06	49.59	2.37	34.14	43.82

The most marked difference is in the size of the grains, in which the white varieties have the advantage. In this table and the following the number 10 is used to denote the maximum of rust tendency.

Mane oats and the spreading varieties compared.—This table gives the particulars of comparison between the varieties of oats grown with the head on one side and those with the spreading head :

	No. of varieties.	Agerage yield per acre.	Average weight per bush.	Rust tendency.
		bush.	lbs.	
Mane Oats	20	46.30	32.34	2.75
Spreading variety	72	43.02	34.66	2.16

The opinion is somewhat widespread that the Mane varities are the best yielders, and the results given in this table certainly tend to justify that idea, but it should be borne in mind that in the table containing the best ten yielding varieties, they all possess the spreading head. The Mane oats seem decidedly more prone to rust.

Oats grown upon large plots.—Thirteen varieties of oats were grown in plots varying from one-third of an acre in size to one acre. The highest yields were as follows :—

White Poland	49.2	bushels	per acre.
Black Etampes	47.1	"	"
American Banner	45.4	"	"

For full particulars see the report on page 171.

Barley sown at different dates.—This table gives the results from sowing barley in duplicate plots at three different periods :

Dates of sowing.	Average yield per acre.	Agerage weight per bushel.	Average weight of straw per acre.
	bush.	lbs.	Tons.
May 1	37.3	49.88	1.02
May 9	31.2	46.25	1.04
May 17	18.0	41.88	.77

Spring Wheat sown at different dates.—This table gives the results from sowing spring wheat at different periods :

Dates of sowing.	Yield per acre.	Weight per bushel.	Weight of straw per acre.
	bush.	lbs.	Tons.
May 1	10.65	57.4	1.35
May 9	6.26	56.5	1.15
May 17	5.04	56.0	1.04

Oats sown at different dates.—This table gives the results from sowing oats in duplicate plots at different periods :

Dates of sowing.	Average yield per acre.	Agerage weight per bushel.	Average weight of straw per acre.
	bush.	lbs.	Tons.
May 1	30.9	30.5	2.07
May 9	25.0	24.5	1.73
May 17	19.1	21.5	1.66

These experiments with sowing three varieties of grain at different periods emphasize the importance of sowing grain at the earliest possible moment in the spring after the ground becomes dry. It would have added much to the value of the experiments if the first sowing had been earlier, but the wet condition of the ground put aside for the purpose rendered this impossible.

WINTER WHEAT EXPERIMENTS.

These experiments, the full details of which are given on pages 164, 165 were summarized in the bulletin, given below, which appeared before the sowing of the winter wheat crop :—

BULLETIN LIII.

WINTER WHEAT EXPERIMENTS OF 1890.

It is the natural tendency with all cereal grains to deteriorate when grown long in one locality without change, the full reasons for which have never yet been given to the world. Because of this the necessity arises for a change of seed, and ultimately for the introduction of new varieties. In selecting the most suitable of these for his locality the farmer frequently finds difficulty. This arises in part from the unreliable nature of the information not unfrequently given by those who introduce these new varieties, and in part from the absence of information that would enable the purchaser to compare the merits of these with those of standard varieties. With a view to give such information this bulletin—the first issued on growing winter wheats on this farm—has been prepared, and it is hoped that it will reach the farmers in time to serve the intended end.

From the information given in the subjoined table, the farmer who understands the nature of his soil can readily decide as to which of the kinds thus compared, are most likely to give satisfactory results when grown on his land. If his soil does not naturally produce a stiff straw, he can reject all varieties that are weak in this respect. If it requires strong growing varieties, he knows which possess these qualities; and if rust is practically unknown in his locality, as is sometimes the case, he need not of necessity reject those most inclined to rust, as they may possess other qualities of much value.

Fifty-two varieties in all have been tested on the farm during the present year, of which twenty-one are Canadian and thirty-one foreign. Of the foreign varieties, fifteen samples came from England, eight from France, five from Germany, one from Russia and one from Scotland. Some of these varieties stood the winter well, and possess much promise for the future. Full particulars will be given regarding them in the next annual report.

Of the eighteen Canadian varieties contained in the subjoined table, some are old standard sorts, grown with the object of rendering more valuable the comparisons of the new varieties. The tests were made on plots of one-hundredth of an acre each, in a soil which may be termed a clay loam, but somewhat sandy in its texture. It possessed a decided slope to the south-west, and was therefore fully exposed to the sweep of cold winds while the ground was bare so much of the time last winter.

The following is a list of the Canadian varieties, with the most important particulars regarding their growth and behavior :

Varieties.	Matured, July.	Chaff.	Rust tendency.	Strength of straw.	Color of grain.	Yield per acre. Straw.	Yield per acre. Grain.	Weight of grain.
						lbs.	Bush.	lbs.
Golden Drop	25	Ba.	2	M	G	4,675	32 1-2	61 1-5
Surprise	19	Ba.	1½	S	W	5,656	29 3-5	58 2-3
Manchester	23	Ba.	5	M	A	4,825	30 2-5	61
Bonnell or Landreth	25	Ba.	1	S	W	5,025	32 1-12	61
Seneca or Clawson	25	Ba.	1	S	W	3,475	25 2-5	59
Rogers	27	Ba.	2	S	A	5,475	34 3-5	60 3-4
Hybrid Mediterranean	21	Be.	3½	W	A	4,708	32 1-12	60 1-6
Martin Amber	27	Ba.	2	S	A	4,050	32 1-2	62 1-2
Standard	24	Ba.	3	S	W	4,250	31 7-10	59 1-3
Red Velvet Chaff	23	Ba.	2	S	R	4,950	35 4-5	61
Lancaster	20	Be.	2	W	R	6,650	33 1-3	61 2 3
Early Red Clawson	22	Ba.	2	S	R	5,025	32 1-12	58
Volunteer	19	Be.	3	M	R	6,350	36 1-4	58 1-2
Golden Cross	20	Be.	3	S	R	5,125	27 9-10	58
New Monarch	27	Ba.	3	S	R	3,756	20	56 2-3
Red Lion	23	Be.	2	S	R	4,400	29 1-6	60
Democrat	28	Be.	4	S	A	4,350	20	56 1-2
Garfield or Natural Cross	28	Ba.	2	S	W	3,300	15 4-5	57

NOTE.—The first twelve varieties were sown on 10th September, Volunteer on the 12th, Golden Cross, New Monarch and Red Lion on the 19th, Democrat on the 27th and Garfield on October 7th. The late sowing of the two varieties last named was owing to an oversight in shipping on the part of the seedsman from whom they were ordered. In the third column "Ba" denotes bald chaff, and "Be" bearded chaff. In the fourth column "1" denotes freest from rust tendency. In the fifth column, strength of straw, "M" denotes medium, "S" strong and "W" weak. In the sixth column, color of grain, "A" denotes amber, "G" golden, "R" red and "W" white. In the eighth column the yield per acre is computed from the yield of the plot, and in the ninth column the weight of grain is per measured bushel.

In regard to the foregoing it will be observed :

1. That while none of the yields are so large as on some other soils, they are all fairly good. The largest yielders per acre are the Volunteer and the Red Velvet Chaff, and the heaviest yielders per measured bushel are the Martin Amber and the Lancaster.

2. That the varieties least susceptible to rust are the Bonnell or Landreth and the Seneca or Clawson, about equal, followed by the Surprise, while those most susceptible are the Manchester and Hybrid Mediterranean, of which the test was not a fair one owing to the late period of sowing it. These varieties both rusted badly in field plots, the former in 1889 and the latter in the present year.

3. That in the opinion of competent judges the best varieties for milling purposes are the Lancaster, Red Lion and Velvet Chaff among the red wheats, and the Bonnell or Landreth among the white. This feature is very important, as no variety unsuitable for grinding will retain its place long, whatever good qualities it may otherwise possess.

4. That the best varieties for this locality, taking into consideration yield, weight, strength of straw, freedom from rust and value for milling purposes, are perhaps the Red Velvet Chaff, Lancaster, Martin Amber and Volunteer, in the order named, and probably the best single sort is the Red Velvet Chaff. It is a rather new variety, grows strong and tall and stands well, has a long and uniform head, yields well and weighs well, but is considered a trifle soft. It should be remembered however that this wheat is not the same as another variety called Canadian Velvet Chaff, a white wheat and one not yet tested by us.

5. None of the newer varieties are so decidedly superior to the older ones as to render it certain that they will become decided favorites. The safe plan will be to test them by sowing one or two bushels, which, if they do well, will provide abundant seed for another year.

Of the thirty-one foreign varieties of winter wheat sown in the autumn of 1889, no less than twelve completely succumbed to the severity of the winter. There are therefore only nineteen varieties to report from. The table below gives the particulars regarding the four varieties of foreign winter which proved themselves superior :—

Name of variety.	Country whence obtained.	Yield per acre.	Weight of grain per bushel.	Weight of straw per acre	Tendency to rust.	Date of maturing.
		Bush.	lbs.	Tons.		
Galezien Summer.........	Germany ..	32.5	62⅔	2.05	Very slight....	25th July.
White Square Head	Germany ..	32.08	57½	2.22	Considerable...	30th "
Russian Odessa..	Russia.....	28.33	60⅔	2.05	Considerable...	30th "
Lamed Hybrid...........	France	26.25	59	1.79	Considerable...	30th "

The Galezien Summer stood up perfectly, and was almost entirely free from rust. The only other variety that could be pronounced ahead of it in this respect was the Rietti from France, which killed out considerably during the winter, but yielded notwithstanding 19.13 bushels to the acre. The Galezien Summer is a bald wheat with a white chaff and a medium sized kernel of excellent quality. The return was the most satisfactory obtained from any variety grown, Canadian or foreign, if yield and weight per bushel are considered.

The One-grained Spelz fall wheat could not be considered in striking averages, as the kernel was enclosed in a hull after threshing. It requires the use of special machinery to separate the grain from the hull. It appears to be very hardy and was this year entirely free from rust. As the yield was 47.33 bushels per acre, it is quite possible that it may be found useful in time to grow for feeding.

EXPERIMENTS WITH FIELD ROOTS, POTATOES AND RAPE.

A large number of varieties of field roots were grown in rows, in most instances three rows of each variety. These rows were alongside of each other and in the same range of fairly even soil in field No. 17. There were also grown in the same range a large number of varieties of potatoes and of these three rows were grown of each variety. In fields Nos. 3 and 14, a number of rape plots were grown and in various ways. A summary of the more important results of these experiments is given in the succeeding paragraphs, which relate to each respectively :—

Field Roots.—These comprised forty-eight varieties of turnips, twenty-nine of mangels and eleven of carrots. The ground was ploughed out of sod the previous year, and was liberally manured in the spring. The sod had been skimmed with a light ploughing just after harvest and this was followed by a deep ploughing later.

Turnips.—Of these sixteen of the varieties grown were white or yellow fleshed and thirty-two were of the Swedish sorts.

Of the white and yellow varieties, the following took the lead :—

Name of variety.	Yield per acre.	Average weight of each root.	Color of flesh.
1st. Red Globe Norfolk...........	26.52 tons or 884 bushels.	4.60 lbs.	White.
2nd. Red Top Strap Leaf	20.68 " 689⅓ "	6.88 "	White.
3rd. Mammoth White	20.15 " 671⅔ "	6.64 "	White.

Of the Swedish varieties, the best are given in the statement below :—

Name of variety.	Yield per acre.	Average weight of each root.
1st. Carter's Elephant Swede	20.98 tons or 699⅓ bushels.	2.26 lbs.
2nd. Fetticairn	20.91 " 697 "	2.54 "
3rd. Royal Norfolk............................	20.19 " 673 "	2.14 "
Skirving's Purple Top Swede................	12.38 " 412⅔ "	1.81 "

It should be borne in mind that these three varieties are new, or not very long introduced. The seed of the Red Top Strap Leaf came up rather sparsely or it probably would have given the best yield. Carter's prize Elephant Swede was introduced into this country by the seed firm of old London after whom it is named. It is an oblong turnip, and holds its width well down. Skirving's Purple Top Swede is an old standard variety and was introduced here solely for purposes of comparison. The comparison shows the necessity of introducing new varieties from time to time. (See page 174.)

Mangels.—Of the 29 varieties of mangels grown, those which took the lead stand in the order named :—

Name of variety.	Yield per acre.	Average weight of each root.
1st. New Giant	14.62 tons or 487⅓ bushels.	2.00 lbs.
2nd. Yellow Intermediate	14.23 " 474⅓ "	2.44 "
3rd. Pearce's Clan Giant	14.04 " 468 "	1.75 "

The Yellow Intermediate is a tried variety, hence, judging by this test we have nothing much superior. (See page 176).

Carrots—Of the 11 varieties of carrots grown, the three best yielders are mentioned :—

Name of variety.	Color.	Yield per acre.	Average weight of root.	Average length of root.
1st. White Vosges or Giant Short.	White.	17.78 tons or 592⅔ bus.	.85 lbs.	10 inches.
2nd. Mitchel's Perfected	Deep Orange.	17.02 " 567⅓ "	.59 "	9⅓ "
3rd. White Belgian	White.	16.64 " 554⅔ "	.67 "	12½ "

The White Belgian is a standard variety, so that in this instance we have an excellent standard of comparison. The White Vosges took a decided lead last year. It is of large size, a clean grower, not too long, and, therefore, easily harvested. Mitchell's Perfected is a new Canadian variety, introduced by a gentleman of St. Mary's, and it is full of promise. (See page 176).

Potatoes.—The 28 varieties of potatoes grown, which are first in point of yield, in regard to mealiness, flavor, and mealiness and flavor combined, are given in the order named below :—

Name of variety.	Yield per acre.	Early or late.	Best as to mealiness.	Best as to flavor.	Best as to mealiness and flavor.
	bushels				
Thorburn	162	Early	Clark's No. 1	Beauty of Hebron.	Beauty of Hebron.
Empire State	162	"	Daisy	Convoy	Daisy.
Daisy	157½	"	Convoy	Daisy	Convoy.
Early Puritan	139½	"	Beauty of Hebron	Green Mountain	Thorburn.
Clark's No. 1	139¼	"	Thorburn	Thorburn	
Summit	137	"			
Beauty of Hebron	99	"			
Late Rose	94½	Late.			

The Beauty of Hebron and Late Rose are mentioned for the purpose of comparing yields, both being tried and standard varieties. From the comparison we must conclude that for large yields in our soil the Thorburn and Empire State stand at the head, but it will be noticed they do not rank high for table uses. Taking them all in all the Beauty of Hebron, the Daisy, and the Convoy rank highest for table use in the order named. If yield and suitability for table use are considered, the Daisy should probably get the first place. The testing of the quality was done in a somewhat practical way. Twelve potatoes of each of the varieties named were given to three different heads of departments, who were to take notes of the qualities of the potatoes when boiled with their skins on and at the time of the meal. These findings were compared, with the result which has been stated. There was much agreement between the reports. (See page 172.)

Rape grown on four kinds of soil.—A most interesting and instructive experiment was carried on with growing rape on four different kinds of soil on plots that were made. These were loam, marl, clay and muck. The plots were in duplicate and on one only of each salt had been applied with the two previous crops at the time of sowing them, and at the rate of 400 pounds per acre each year. The crop of 1889 was oats and that of 1888, barley; no salt was applied with the rape. The rape plants were equally thinned to enable them to develop well and to equalize the conditions.

The table below gives the results :

Kind of soil.	With or without Salt.	Yield per acre.	Average yield per acre.
		Tons.	Tons.
Loam	Salt	9.45	8.005
	No salt	6.56	
Marl	Salt	6.72	5.320
	No salt	3.92	
Clay	Salt	2.81	2.605
	No salt	2.40	
Muck	Salt	4.77	4.525
	No salt	4.28	

The point brought out here in reference to salt is of much significance. The salt it will be remembered was applied during the previous years. The oats of the previous year and the barley preceding that, gave the best returns where the salt was applied, and this year the difference in the yield of rape on the same plot is marked. From this we draw the conclusions (1) That salt acts beneficially on a rape crop where applied plentifully the two years preceding the growing of the rape, and (2) that it does so in a marked degree. It is also apparent from this experiment that while loam is good for growing rape, clay is of no use practically for this purpose. The results from the humus or muck-soil are not of much consequence, owing to the injury which the plots received from the wet. (See p 178.).

Rape with Fertilizers.—In this experiment rape was grown in small plots, and the different fertilizers named in the table below were applied when the plants were about one-third grown. The estimated yield of the rape was made from averaging four different plots similarly treated. These plots comprised two rows each 66 feet long, and all in the same range. They were 22 inches apart and between each plot fertilized one row was grown without any fertilizer. The table subjoined gives a summary of the results :

Name of fertilizer.	Quantity of fertilizer applied per acre.	Yield of rape per acre.
	lbs.	Tons.
Sodium nitrate	150	10.012
Dried blood and scrap	300	9.034
Salt	300	8.685
Superphosphate	300	8.111
Unleached wood ashes	750	8.111
No fertilizer	....	8.044

As was to be expected the quick action of the nitrate of soda produced the most marked results. Until we ascertain more definitely the approximate value of rape per ton, we cannot draw safe conclusions as to the real value of these fertilizers in growing rape.

Rape grown in Drills and on the Level.—This experiment resulted as it did last year in favor of level culture (see Report for 1889, p. 140). The return was

From the drills	8,520 lbs.
From drills grown on the level	10,095 "

There is an important problem yet to be solved for the farmer in the relative merits of growing roots and rape on the level or in drills. It is quite possible that it may yet turn out that the former method is preferable if we only had the machinery which would enable us to sow a number of drills at once and to cultivate as large a number. It would require to be drawn by two horses. Here is an unoccupied field for the inventor. (See p. 179).

Rape thinned and not thinned.—In this experiment the rape was sown in drills. Four pounds of seed was used to the acre. In the plots thinned the distance between the plants was 15 inches. The thinning was done when the plants were about one-third grown, which was, it may be, rather late. The late sowing of the rape, about the middle of July, probably tended to reduce the relative yield of the thinned plots. The yield was

From the unthinned plots	27,376 lbs. per acre.
" thinned "	5,505 "

These results should lead us to hesitate about using too small a quantity of seed. It may turn out as further investigation is made in this direction, that less than one pound of seed per acre as now recommended is too small an amount to sow.

LIVE STOCK EXPERIMENTS.

The experiments in live stock follow each other in a constant succession, and as frequently as room can be obtained for conducting them. While the field for live stock experiments is without limit, the facilities for conducting them with us are circumscribed, although we compare well in this respect with other institutions. While experiments in the field may only be circumscribed by the ambition of the parties controlling them and the amonnt of means and suitable land at their disposal, those with live stock are largely circumscribed by the amount of the building accommodation. Live stock experiments require relatively a large amount of room. Each animal or group of animals requires a separate apartment which must also be sufficiently commodious, otherwise the value of the experiment will be impaired. The farmers who say to us, as they not infrequently do, "Why don't you conduct this experiment or that" will please bear in mind what I have stated above. Give us the clay and the straw, and we will render unto you the full tale of bricks.

The following are the principal of the live stock experiments for the year :

1. The fattening of cattle on corn ensilage and meal; corn ensilage, hay and meal; and roots, hay and meal. The object sought was to ascertain the relative cost and suitability of these respective rations for fattening purposes. (See pages 156 and 226).

2. The fattening of lambs on rape, and subsequently on a winter ration of hay, grain and roots, to determine the value of this system of producing mutton. (See pages 118 and 189).

3. The feeding of pigs on ensilage and meal, roots and meal, and meal alone, to determine the suitability of these respective rations in producing pork, and also their relative cost. (See pages 120 and 190).

4. The feeding of pigs on a ration of peas and barley whole, on the same grains ground, and on a mixture ot various kinds of meal, with the object of testing these rations intrinsically, and as pitted against each other in making pork. (See pages 122 and 192).

5. The feeding of pigs on meal alone, and meal with cut green food added in different proportions, to ascertain the proportion of green food that should be added to the meal. (See pages 125 and 193).

6. The feeding of cows in the stable on green food, to ascertain the average required to sustain a cow during the soiling season. (See pages 127 and 196).

7. The rearing of grade steers of the various breeds, embracing the Shorthorn, Hereford, Aberdeen-Poll, Galloway, Holstein, Devon, and native or scrub. The objects of this experiment include the following along with others : (1) To ascertain the comparative merits of these respective breeds for beef making purposes; (2) the relative gains at different periods of growth, and (3) the cost of production. (See pages 128 and 196).

FATTENING STEERS FOR EXPORT ON DIFFERENT RATIONS.

The opinion has hitherto extensively prevailed that beef cannot be made at a profit in winter in sections of the country where roots cannot be grown successfully. If this were true, it would then follow that this product could not be grown in large sections of this province. This experiment was undertaken with the object of ascertaining some mode of beef-making in the stall that would prove successful without the aid of roots, and if possible at no greater outlay. The results are given below in bulletin XLIX., issued May 28th, 1890.

BULLETIN XLIX.—CORN ENSILAGE AS A FOOD FOR MAKING BEEF.

The idea that beefing animals cannot be fed at a profit has been pretty generally indulged in of late, owing to the relatively low prices obtained for some time past compared with those of former years. The experiment conducted at this institution last winter with the utmost care and precision, the details of which are given below, happily disproves the correctness of this idea.

Ten good Shorthorn grade steers, two and three years old, were purchased and brought to the farm, October 19th, 1889. The price paid for them was $500, which was a little extreme, owing to the difficulty of getting a uniform lot and for other reasons. They were sold 16th May following for shipment to Britain for $897.30, or an advance of $397.30, the price received being 5¾c. per pound live weight.

From the date of their arrival at the farm until the close of the year they did not much more than pay for the food fed them, because of the imperfect facilities for feeding, arising from the unfinished state of the new buildings.

Six of the ten, all three years past, were selected for a feeding contest which commenced 31st December, 1889, and closed 29th April, 1890, thus lasting 119 days. The primary object of the test was to ascertain the value of corn ensilage and meal for beef making as compared with (*a*) corn ensilage, hay and meal, and (*b*) roots, hay and meal the ration usually fed.

Feeding.—Group 1, comprising lots 1 and 2, were each fed an average of 79.4 lb. of ensilage per day and 12.7 lb. of meal. There was left uneaten of the ensilage 18 lb. per day of the coarser portions, but the whole amount fed was charged against the steers.

Group 2, comprising lots 3 and 4, were fed daily 41.6 lb. ensilage, 11.3 lb. hay and 12.7 lb. meal. There was left uneaten of the fodder 13½ lb. per day, which amount was also charged against the steers.

Group 3, comprising lots 5 and 6, were fed daily 14.3 lb. hay, 41.6 lb. roots and 12.7 lb. meal.

The meal consisted of equal parts by weight of pease, barley and oats, and was always mixed with the other food. The hay (clovery and not extra in quality) was cut and mixed with the other food, and the roots were pulped and mixed likewise. The food was fed in three feeds daily, and water was virtually given in the stall ; everything given except bedding and water was accurately weighed.

Charges for Food, Bedding and Labor.—The food given, except roots and ensilage, was charged at the average market values in Guelph, viz : Pease 55c., barley 40c., and oats 28c. per bushel, or an average of ⅞c. per lb. for the mixture ; hay $6.50 per ton, roots 8c. per bushel in the cellar, and ensilage $2.50 in the silo.

The bedding used was estimated at 15 lb. per head per day, and charged as worth $1.50 per ton in the barn.

The labor was estimated on the assumption that one attendant at $25 per month would feed and care for 40 head as ordinarily fed ; that $2.50 per week would pay for the additional outlay in assisting the said laborer in cutting, grinding and pulping the food, and that the *additional* help in preparing the food in this contest be charged at half this rate, on the ground that the ensilage was already prepared.

Estimated Value of the Manure.—The manure was estimated at 75 lb. per day per head, and valued at $1.50 per ton, as the standard value of manure made from ordinary stock is usually put at $1 per ton in the yard.

Increase in Weight and Daily Cost for Food.—The particulars are given in the following table:

Groups.		Weight at commencement.	Weight at close.	Total gain.	Average daily gain of each group.	Average cost of feed per day.
		lb.	lb.	lb.	lb.	cents.
1	1	1,515	1,762	247	1.85	21.02
	2	1,327	1,520	193		
2	3	1,469	1,691	222	1.857	20.74
	4	1,393	1,613	220		
3	5	1,477	1,696	219	1.697	21.40
	6	1,341	1,526	185		

Aggregate weight of the six steers at commencement of the contest	8,522 lb.
Estimated value at 4¼c. per lb. live weight	$362 18
Aggregate weight at close	9,808 lb.
Estimated value at 5 7-12c. per lb. and equivalent to 5¾c. the selling price when shrunk 15 days hence	$547 61
Increase in value in 119 days	185 43
Total cost of food	150 32
Increase in value over cost of food	35 11
Total estimated cost of attendance	18 00
Cost of bedding, 10,800 lb.	8 10
Value of manure, 27 tons	40 50
Value of manure over cost of attendance and bedding	14 40
Weight May 15th at 8 p.m.	10,149 lb.
Weight May 16th at 8 a.m., the steers lying out in yard over night	9,763 lb.
Average loss by shrinkage	64⅛ "

Financial Summary.—The financial results of the experiment stands thus:

Direct gain on food fed	$35 11
Indirect gain from the value of manure over the cost of bedding and attendance	14 40
Direct and indirect profit	$49 51
Or a profit on each animal of	8 25⅙

To this may be added in all fairness the profit from raising the food fed, whatever that might be, for this was estimated at market values.

Conclusions.—The above experiment certainly tends to establish the following important conclusions:

(1) That shipping steers can be fed at a fair profit with prices of grain as at present, when of good types, when they are purchased at reasonable rates and where there are suitable facilities for feeding.

(2) That corn ensilage and meal will fatten as effectively and as cheaply as a ration of roots, hay and meal and with a less expenditure of labor.

(3) That steers fasted twelve hours by simply turning them into a yard at night will shrink from 60 to 70 lb. each.

(4) That with food at present prices, such as that used above, steers weighing from 1,300 to 1,500 lb. can be made to gain on an average 1.801 lb. per day, and at an average cost of 21.053c. per day for the food fed.

(5) That the value of the animals for beefing purposes was increased by the fattening process an average of 1½ cents per pound from commencement to finish.

It will be observed that the ensilage left uneaten by the steers was not wasted but was given to other cattle not under the pressure of high feeding. (See p. 186).

FATTENING LAMBS.

The fattening of lambs or even of sheep has not hitherto received much attention from the Ontario farmer and is therefore not well understood by many. Our object in this and kindred experiments which are to follow, is to ascertain not only the practicability of autumn and winter feeding, viewed from the standpoint of profit, but also the cheapest method of accomplishing this end. Full details of this experiment are given in the bulletin subjoined, which was issued on June 9th, 1890 :—

Bulletin LI.—Fattening Lambs on Rape and Finishing them on a Winter Ration.

This experiment, so encouraging in its results, was commenced Oct. 10th, 1889, and concluded on February 10th, 1890, but the 22 ewe lambs of the lot were not delivered as sold until 14th March, nor the wether and ram lambs until 24th March. They were slaughtered in Guelph and shipped to Halifax.

The Lambs.—Forty-eight grade lambs were purchased from the farmers in the vicinity and were brought to the farm October 9th, 1889. They consisted of Leicester, Cotswold, Oxford Down and Shropshire Down grades, the majority being Cotswold and Oxford-Down grades of good types. They were weighed October 10th and were turned in on the rape to pasture the same day. They remained there until December 3rd, when owing to a snow storm they were brought in to the sheep sheds and were again weighed on December 10th, two months after the commencement of the experiment. While on the rape they were fed in troughs one-half pound each of oats daily and were given salt at will, but they were not given any water.

The Rape.—The portion of the rape field pastured by the lambs comprised eight acres. The rape was sown in drills on July 10th, about ten days later than was intended owing to the wet weather of that time. The field was an outlying one, which was very badly in need of cleaning. The hilly portions which were dry and gravelly had received a light but insufficient coat of barnyard manure. The crop of rape was fair in the valleys but light on the hills. The eight acres, however, would have well sustained 70 to 80 lambs during the period of pasturing, as much of it was still uneaten when the lambs were removed.

Results from Feeding on the Rape.

Aggregate weight of 48 lambs at the commencement of the experiment, October 10th	4,612 lb.
Aggregate weight December 10th, a period of 62 days, of which the last 7 days were spent in the sheds.	5,476 "

Aggregate gain	864 ℔.
Average weight at commencement	96 "
Average weight at close	114 "
Average gain in 62 days	18 "
Average gain per month	9 "
Average gain per lamb per day	.29 "

Price paid for 48 lambs, October 9th, the date of purchase	$184 70
Average price paid per head	3.84 4/5
Price paid per pound live weight	.04
Estimated value of 48 lambs, December 10th	273.80
Estimated average value	5.70 5/12
Estimated value per pound live weight*	.05
Aggregate increase in value in 62 days	89.10
Average increase in value	1.85 5/8

Feeding Rations in the Sheds.—From December 10th, 1889, to the close of the experiment, February 10th, 1890, the lambs were fed the following daily rations: Grain, consisting of whole oats only, 1.057 ℔.; turnips, sliced, 5.107 ℔.; clover hay, of rather poor quality, what they would eat.

*This estimated value per pound on December 10 is fixed upon as five cents, as that price could have been obtained for the lambs delivered in Guelph at that date.

Results from Feeding in Sheds.

Aggregate weight of 48 lambs, December 10	5,476 ℔.
Aggregate weight of 47 lambs (one having died), February 10	6,020 "
Aggregate increase in 59 days	544 "
Average weight per head, December 10	114 "
Average weight per head, February 10	128 "
Average increase per head in 59 days	14 "
Average increase per head per day	.237 ℔.

The whole lot were separated into two and sometimes more than two divisions as occasion required, and were allowed to run in small yards at will except in times of storm. One lamb which weighed 140 lb. died one night in January from the effects of getting on its back. The inferior quality of the hay was caused by coarseness and some damage from stacking. It is to be regretted that owing to lack of facilities the hay was not weighed, as we are thus prevented from getting exactly at the cost of the winter ration, but we feel justified in concluding from the data which we have, that the increase in value during the term of feeding in sheds, including the value of the manure, exceeded the cost of the food, bedding and attendance. They had access to water all the time.

Summary.—Following is a summary of the experiment from beginning to close:

Average weight of 48 lambs at time of purchase, October 10	96 ℔.
Average weight of 47 lambs delivered 14th and 24th March respectively, after a fast of twelve hours	137 "
Average increase in weight from October 10	41 "
Aggregate weight of 47 lambs when sold after fasting twelve hours	6,440 "
Price paid for 48 lambs October 9, at 4.005c. per ℔. live weight	$184 70
Price received for 47 lambs on the dates already given at 5¾c. per ℔. live weight	370 30
Increase in value	$185 60

Average price paid per head October 9	3.84 4/5
Average price received per head when sold	7.71 2/5
Average increase per lamb	3.86 2/5
Increase per ℔. live weight	.01¾

The 22 ewe lambs delivered March 14th weighed on an average 129 ℔., and the 25 wether and ram lambs 144 ℔. It will also be observed that the lambs were sold for more than *twice* the sum paid for them and that the loss of one lamb lessens the return by about $8.50.

Conclusions.—The following conclusions may be drawn from the above experiment :

(1) That good grade lambs may be made to gain 9 ℔. per month when pasturing on rape with a supplement of ½ ℔. oats per day.

(2) That the same class of lambs may be made to gain 7 ℔. per month on a winter ration of clover hay, and say 1 ℔. oats and 5 ℔. roots per day.

(3) That lambs pastured on rape for two months, with a supplement of ½ ℔. oats per day, may be made to increase in value about $2 per head.

(4) That good lambs judiciously purchased at the ordinary selling rates in autumn, and treated as described in this experiment, may be made to increase in value more than the sum paid for them in say 5⅓ months time and on the condition that the buying and selling prices are relatively the same as in this experiment.

(5) That lambs thus purchased and fed may be made to increase in value 1¾c. per ℔. live weight.

Note.—Ontario has extensive areas very suitable for growing rape. Would it not be well if the farmers would greatly increase the acreage of this crop and thus adopt an easy mode of manuring their land, an effective way of cleaning it, and a profitable way of disposing of their lambs?

THE RELATIVE VALUES OF CORN ENSILAGE AND FIELD ROOTS FOR PRODUCING PORK.

Corn ensilage has been clearly shown to be of great value in milk production. Its value for making beef is also becoming recognised. There is not so much known regarding its value in pork production. This experiment was undertaken in the hope that more knowledge of this nature would be forthcoming. The bulletin issued on the subject appeared 1st October, 1890. It is given below :

Bulletin LIV.—Corn Ensilage and Roots as Food Factors in Swine Feeding.

This experiment was commenced on January 10th, 1889, and terminated on March 28th, thus covering a period of 77 days. Its primary object was to ascertain the value of corn ensilage and roots, both essentially and relatively, when used as food adjuncts in feeding swine in the winter season. Several other facts of great interest and much value to the farmer were, however, brought out in the experiment, such as the large profits from the judicious feeding of swine, the rate of the daily increase in weight which results from such feeding, and the extent of the mistake in keeping them simply on a maintenance diet.

The Animals Selected.—The animals chosen for the experiment were grade Berkshires, bred upon the farm from a pure sire, and out of three different dams from the same litter. They were divided into three groups. Each group contained three animals, two barrows and one sow. The individuals of each group were from different dams, and one of each of the three was in every instance from the same dam. They were all in good store condition. The conditions therefore at the outset were very similar.

Period of Preparation.—Two weeks prior to the commencement of the experiment each group was put in a separate pen 6 ft. by 10 ft. (all the room available), after having been carefully weighed. They were at once put upon the food ration which was to be given them throughout the experiment. At the commencement of this period the pigs in group 1 fed on meal, weighed 618½ ℔. ; those in group 2 fed on roots and meal, weighed

583½ lb. ; and those in group 3 fed on ensilage and meal, weighed 602½ lb. During this preparatory period the pigs in group 1 gained 37 lb., those in group 2 gained 12 lb., and those in group 3 lost 12 lb., as they did not take kindly to the ensilage.

Food and Feeding.—The pigs in group 1 were fed 18 lb. of meal per day for a time. Toward the close of the experiment this was increased to 19½ lb., which however proved a larger quantity than they would eat clean and so cloyed their appetites that the quantity had to be reduced to 12 lb. per day. The average amount fed per day throughout the experiment was 16½ lb. This meal ration consisted of ground oats, ground barley, ground pease and wheat middlings in the proportions by weight of 1, 1, 2 and 1 respectively. Those in group 2 were fed all the sliced turnips they would eat clean, which was 60 lb. per day on an average. They took rather more toward the close of the experiment than at the outset. To the roots was added a meal ration similar in kind to that given to the pigs in the first group, but only one-third of the amount. It averaged therefore 5½ lb. per day, and when fed it was sprinkled upon the sliced turnips. The pigs in group 3 were fed daily 35 lb. of ensiiage on an average. The meal fed was similar in quantity and kind to that fed to the pigs in group 2, and was likewise sprinkled upon the ensilage. When feeding the ensilage was masticated by the pigs, but a large proportion of it was not swallowed by them. It had been cut in 1½ inch lengths, which is manifestly too coarse for feeding swine. The food was given in three feeds per day and all the water was supplied that the pigs would take. Those fed on roots took but a small quantity ; those fed on ensilage required more. The water given to the pigs in group 1 was poured on the meal when it was put in the trough.

Value of the Food.—Estimating oats to be worth 28 cents per bushel, barley 40 cents, pease 55 cents and wheat middlings $15 per ton, the average value of the meal ration per pound was seven-eighths of a cent. The roots were valued at 8 cents per bushel and the ensilage at $2.50 per ton.

The following table gives the relative increase in weight and the cost of food during the experiment for each group :—

——	1	2	3
Weight at commencement...lb.	655½	595½	590½
Weight at close...lb.	926	735	671
Total gain...lb.	270½	139½	80½
Average daily gain of one animal in each group.........................lb.	1.170	.604	.348
Cost of feeding for 77 days...$	11.11	9.87	7.07
Cost of food for one animal per day.............................cts.	4.81	4.27	3.06

The next table gives the relative values at the beginning and at the close of the experiment, and the net gain or loss :

——	1	2	3
Value at commencement of the experiment..................$	29 50	26 80	26 57
Value at close of the experiment..............................$	48 61	36 75	31 87
Advance in value ....$	19 11	9 95	5 30
Net gain or loss ....$	8.00 gain.	.08 gain.	1.77 loss.

The pigs were all valued at 4½ cents per pound live weight at the beginning of the experiment, as this was the price given for such pigs at the time in the Guelph market. At its close those in group 1 were sold at 5¼ cents per pound live weight, those in group 2 were valued at 5 cents per pound, and those in group 3 at 4¾ cents per pound. It may be well to note here that the direct profit on the original investment arising from feeding the pigs in group 1 for 77 days was no less than 27.11 per cent. on the investment, while the direct profit on fattening the steers referred to in Bulletin xlix. was only 9.69 per cent. on the investment in 119 days. The value of the manure made in feeding the pigs would considerably more than pay the cost of the labor. The pigs in groups 2 and 3 were fed for 41 days after the close of the experiment. They were given the same meal ration as before, and each group took on an average 22 ℔. per day. They were sold at 5¼ cents per pound live weight on May 9th. During this period the pigs in group 2 increased in weight at the rate of 1.58 ℔. each per day, and those in group 3 at the rate of 1.95 ℔. each. Those in group 2 were ripe sooner than those in group 3, and this may account for the less rapid gain per day of the former. The total profit on the pigs in group 1 for 77 days was $8.00, that on those in group 2 in 118 days was $4.19, and that on the pigs in group 3 for 118 days was $6.28. In the first instance the whole percentage of profit on the original investment was 27.11 per cent., in the second 15.63 per cent. and in the third 23.63 per cent.

Conclusions.—The following conclusions may be fairly drawn from the above experiment:—

1. That it pays the farmer handsomely to fatten store pigs in winter on a meal ration such as that used in this experiment, when the prices of food and pork bear the same relation to each other.

2. That it does not pay the farmer sufficiently well for the trouble to feed store pigs on a ration of roots in winter when the meal ration used is a small percentage of the whole ration.

3. That when store pigs are fed in winter on corn ensilage and a meal ration, which is but a small percentage of the whole ration, they are fed at a loss.

4. That it will pay better to use a meal ration in winter that will ripen store pigs for market in 77 days, than to first use a ration which tends mainly to develop bone and muscle during that period, followed by a meal ration that will ripen them for market in 41 days.

5. That in fattening pigs it is a serious mistake to attempt to hasten the process by giving any more food than will be eaten clean when it is given.

MAKING PORK FROM GRAINS GROUND AND UNGROUND.

It is a common practice with farmers to feed grain whole in the winter season to store swine, simply because it is the most convenient mode of feeding. This experiment was undertaken to ascertain the extent of the loss arising from this mode of feeding. The subjoined bulletin, issued on December 2nd, gives the more important particulars relating to the experiment and the lessons to be learned therefrom :

Bulletin LV.—Feeding Swine on Grain and Meal.

This experiment began on January 17, 1889, and closed on May 31, covering a period of 134 days. The primary object of the experiment was to ascertain the extent of the advantage arising from feeding swine on a suitable ration of various kinds of meal, mixed, as compared with a grain ration of pease and barley, ground and unground ; or, in other words, to demonstrate to the farmers that swine should not be confined to a ration of unground grain in winter, as they oftentimes are, simply because this mode of feeding them may be convenient.

The Animals Selected.—The animals selected for the experiment were Berkshire grades and pure Berkshires, bred upon the farm. They were by a pure Berkshire sire, out of a grade Berkshire dam in the one case and a pure bred Berkshire dam in the other. They were divided into three groups, each group comprising four animals. Three of the four in each group were grades and from the same dam ; two of the three were barrows and the third a sow ; the fourth animal in each case was a pure Berkshire sow. The grades were farrowed October 4, 1889, and the pure breds September 13.

Period of Preparation.—From December 12, 1889, until January 10, 1890, they were all fed a similar ration of meal and refuse from the college. On January 10, they were divided into three groups, and each group was placed in a separate pen and put upon the ration fed to it during the experiment proper, which commenced on January 17.

Food and Feeding.—The pigs in group 1 were fed pease, barley and oats ground and wheat middlings in the proportions of 2, 1, 1 and 1 parts respectively. Those in group 2 were fed equal parts by weight of ground pease and barley, and those in group 3 were given a similar ration but unground. They were fed three times a day and in quantity all they would eat clean. To the pigs in groups 1 and 2 the water was given along with the meal, and for those in group 3 it was put into a separate trough. They were allowed to run out at will once or twice a week in mild afternoons during cold weather, and more frequently in warm weather.

Estimated Value of the Food.—The food was estimated at the current market values in Guelph, viz. : Pease 55 cents per bushel, barley 40 cents, oats 28 cents and wheat middlings $15 per ton. The average value therefore of the ration fed to the pigs in group 1 was 95c., to those in group 2, 96c. and to those .in group 3, 88c. per 100 lb. An allowance of 8 cents per 100 lb. is included in this estimate for grinding the food.

Food Eaten.—The following table gives the food consumed per average animal in each group, (1) throughout the experiment, (2) for the first 28 days thereof and (3) for the last 15 days :

——	1	2	3
	℔	℔	℔
Throughout the experiment	3.07	2.70	2.36
For the first 28 days	2.02	1.87	2.72
For the last 15 days	4.07	2.72	3.32

Increase in Weight.—The next table gives the average weight of the pigs in each group at the commencement of the experiment and at its close, and also the average increase in weight :

——	1	2	3
	℔	℔	℔
Weight at commencement	57.75	52.33	56.12
Weight at close	166.62	133.66	130.00
Increase in weight	108.87	81.33	73.88

Increase in Value.—This table gives the average value of the pigs in each group at the commencement of the experiment and at its close, the average cost of the food fed to each animal, the average increase in value, and the average gain per cent. :

——	1	2	3
	$	$	$
Value at commencement.	3.47	3.14	3.37
Cost of food	3.93	2.92	2.79
Value at close	8.75	6.55	6.37
Increase in value	1.35	.49	.21
Gain per cent. on the original investment	38.9	15.6	6.20

The pigs were valued at 6 cents per pound live weight at the commencement of the experiment, which is probably what could have been obtained for them at the time for feeding purposes as they were young. Those in group 1 were sold at the close of the experiment for 5¼c. per pound live weight, and those in groups 2 and 3 were valued at the same time at 4.9c. per pound, as they were not in condition for selling. The value of the manure in this experiment would exceed the cost of the litter and labor.

Additional Particulars.—The pigs in groups 2 and 3 did not look well throughout the experiment. They were dry in the hair and skin, and there was a lack of plumpness about them.

One of the pigs in group 2 became so rheumatic 43 days before the close of the experiment that it had to be removed to another pen and put upon another diet. During the 43 days it gained but 11 pounds. Two of the pigs in group 3 also became stiffened in their limbs. The recovery of these rheumatic animals was very slow and imperfect.

Seven of the pigs in groups 2 and 3 were fed fairly well on a suitable ration until September 11, when they were sold at 5 cents per pound live weight. Their average live weight when sold was only 170 lb., or about 9 lb. more than the average weight of the pigs in group 1 at the close of the experiment more than three months earlier.

The average gain of each of the thoroughbred animals during the experiment was 94.66 lb., while the average gain of each of the grades was but 86.37 lb. or 8.29 lb. less.

While the average daily food consumed by each of the twelve animals during the first half of the experiment was 2.06 lb., and during the last half 3.02 lb., the average daily gain during these respective periods was .72 lb. and .60 lb. ; that is to say, the daily gains were greater during the first half of the experiment although the food consumed was much less.

Conclusions.—The following are the more important of the conclusions from the experiment :

1. That it will pay the farmer well to feed swine of the age indicated in this bulletin, and at the season of the year corresponding, on a ration similar to that fed to the pigs in group 1, the prices of feed and pork bearing the same relations, as the gain in this instance was 38.9 per cent. on the original investment in 134 days.

2. That feeding swine for 134 days on a mixed meal ration similar to that given to the pigs in group 1 is more than twice as profitable as feeding them on a ration of equal parts of ground meal and barley, and more than six times as profitable as feeding them on a ration of equal parts of the same two grains unground.

3. That in feeding swine a mixed meal ration comprising several kinds of grain properly blended is far superior to one composed of but two varieties of the same, even though these two may form important ingredients of the more comprehensive ration.

4. That in feeding swine of the age indicated a mixed meal ration that is well balanced will prepare them for market in a far shorter period than one of either ground or unground grains not so balanced.

5. That in feeding swine the respective rations given to the pigs in groups 2 and 3 give results that are far from satisfactory. In both instances one or more of the pigs became affected with rheumatism, in neither case were they ready for the market at the close of the experiment, and in the after feeding the increase in weight was slow. It is indeed probable that they were fed at a loss when the whole results are considered.

6. That in feeding swine when they become rheumatic through feeding a ration too concentrated and stimulating, it will not pay to keep them longer, owing to the slow gains which they make during the period of recovery.

7. That feeding pure bred swine is more profitable than feeding grades, yet too much should not be made of this owing to a little difference in the respective ages.

8. That in feeding swine the cost of producing pork increases with the age of the animal.

FEEDING SWINE ON MEAL AND GREEN FODDER.

The opinion that swine do much better in summer on a ration of grass and meal than on a ration of meal only is almost universal. While this is probably true in the main, it is quite possible that during recent years too much stress has been laid on the importance of pasture in pork production. This experiment was undertaken in the hope of gathering information in regard to the relative values of a meal ration only as compared with a meal and green fodder ration intermixed in producing pork. The bulletin which is given below, and which has recently been issued, gives all the principal details.

Bulletin LIX.—Green Fodder as a Food Factor in Feeding Swine.

This experiment began on June 7th, 1890, and closed October 8th, covering a period of 123 days. The after experiment growing out of it lasted 40 days. Its primary object was to ascertain whether green fodder used as a food adjunct in summer, along with a suitable meal ration, effected a saving in the cost of producing pork, and if so to what extent. A second object was to ascertain whether a large or a small quantity of the green food used in this way furnished the cheaper ration. A third object was to test the correctness of the theory advanced by some scientists which claims that some bulky food mixed with a meal ration in feeding swine secures a more thorough digestion of the meal, since it prevents impaction of the same in the stomach.

The Animals Selected.—The animals selected for the experiment were pure Berkshires and Berkshire grades, all bred upon the farm. There was one of the former in each group. The grades were by a pure Berkshire sire and out of a high grade Berkshire dam, and the pure breds were by the same sire. They were divided into three groups, each group comprised three animals, two of which were barrows and one a sow. The individual animals in each group were from different litters and one animal in each group was in every instance from the same litter. These litters were farrowed at the respective dates, September 11th, 1889, November 25th and December 1st, the pure breds being the oldest. They were all in good store condition at the commencement of the experiment

Period of Preparation.—For one week before the experiment commenced the pigs in the different groups were put upon the ration fed during the experiment. Before that time they had been fed very similarly on meal and refuse from the college.

Food and Feeding.—The pigs in group No. 1 were fed all the meal they would take without waste. Those in group No. 2 were fed about three-fourths as much meal as the pigs in group 1, and also a quantity of green fodder. The pigs in group 3 were fed about one-third as much meal as those in group 2. The aim was to make the quantities of meal used in these two instances exactly two-thirds and one-third respectively of the amount fed to the pigs in group 1, but slight variations were caused by the consumption of the latter of quantities of meal not always the same from day to day, when definite changes were made in the quantities of food fed they were always made at the weighing periods, which were every two weeks. The meal ration consisted of ground pease 2 parts, ground barley 1 part, ground oats 1 part and wheat middlings 1 part. These proportions were by weight. The green food consisted of clover, oats and vetches, and corn and millet as these came in season. It was cut into lengths of about one-half inch by running it through a cutting box, and when fed the meal was mixed with it. Water was always given along with the food.

Estimated Value of the Food.—The food was estimated at the current market values in Guelph, viz.: Pease 55 cents, oats 35 cents and wheat middlings $15 per ton. Eight cents per 100 lbs. were allowed for grinding the meal. The price of the meal mixture used was, therefore, one cent per pound. The green food was charged at $2 per ton.

Food Eaten.—The following table gives the food consumed (1) by each individual animal daily on an average throughout the experiment and (2) the whole amount consumed by the pigs in each group:

——	1	2	3
	℔	℔	℔
By each animal	4½ meal.	3.09 meal. 1.85 green fodder.	1.39 meal. 3.77 green fodder.
By each group	1,520 meal.	1,140 meal. 628 green fodder.	514 meal. 1,392 green fodder.

Increase in Weight.—This table gives the average weight of the pigs in each group (1) at the commencement of the experiment, (2) at its close, the average individual increase in weight and the average individual daily increase:

——	1	2	3
	℔	℔	℔
Weight at commencement	151.0	147.3	147.3
Weight at close	248.3	221.3	167.0
Average increase	97.3	74.0	19.7
Average daily increase	79.0	60.0	16 0

Values.—This table gives (1) the average value of one animal in each group at the commencement of the experiment, (2) the cost of food for one average animal throughout the experiment, (3) the average value of one animal in each group at the close of the experiment, (4) the average individual gain or loss and (5) the average individual gain or loss per cent., (*a*) on value of animals at commencement of the experiment, and (*b*) on value of animals at commencement of the experiment with market value of food included.

——	1	2	3
	$	$	$
Value at commencement	6 79	6 63	6 63
Cost of food	5 07	4 03	2 18
Value at close	12 17	10 84	7 10
Gain or loss	.31 gain.	.18 gain.	1.71 loss.
Gain or loss per cent. on animals	4·56 gain.	2 71 gain.	27.00 loss.
Gain or loss per cent. on animals and food	2.61 gain.	1.69 gain.	19.41 loss.

The pigs were all valued at 4½ cents per pound live weight at the commencement of the experiment, as prime animals brought 5¼ cents per pound at that time. At its close the pigs in groups 1 and 2 were valued at 4 9-10 cents per pound, which was the market value, and those in group 3 were valued at 4¼ cents. As to condition, the animals in group 1 were fat, those in group 2 prime, while those in group 3 were not improved in condition. It will also be observed that the market values had fallen in the meantime. The manure is supposed to form more than an offset to the cost of the labour.

After Experiment.—At the close of the experiment proper on October 8th, a second experiment was commenced to ascertain the probable effects of feeding green food upon pork making during the subsequent fattening period. During this experiment the pigs were all fed upon a ration similar in kind to that fed to the pigs in group No. 1 during the first experiment. This after experiment continued 40 days. At its close on November 17th the pigs were all sold at 4 1-10 cents per pound live weight. The detailed results would unduly enlarge this bulletin. It may be mentioned, however, that though there was a slight relative increase in the rate of gain with the pigs in groups 2 and 3 as compared with those in group 1, it was not at all marked. The prices for prime pork had, in the meantime, fallen from 4½ to 4 1-10 cents per pound, so that the pigs during this period were fed at an actual loss.

Conclusions.—The following are the most important of these :—

1. That while (1) pigs fed for 123 days on a suitable meal ration and housed in summer increase in weight at a rate of 64 per cent., (2) pigs fed on two-thirds the quantity of the same meal ration, the balance of the food being made up of green fodder cut and mixed with the meal, increase at a rate of 50 per cent., and (3) pigs fed on one-third the quantity of the same meal ration, the balance of the food being made up of green fodder cut and mixed with the meal, increase at a rate of only 13.37 per cent., the labor of feeding being also relatively greater where green fodder is given.

2. That when the prices of food and pork are the same, as in this experiment, the gain from feeding pigs, as in group 1, for 123 days in summer will be but 4.56 per cent. on the first cost, as in group 2 but 2.71 per cent., and when fed as in group 3 the loss will be 27 per cent.

3. That in pork making the questions of market values and of the best season to market are of great practical importance.

4. Farmers should study to avoid marketing their pork in the months of October and November, when prices are usually lower than at any other season of the year.

5. That a ration of which the major portion consists of green food, as in the case of that fed to the pigs in group 3, will fail to bring them into a marketable condition.

6. That of the rations given to the pigs in the three groups in this experiment the meal ration fed to those in group 1 has proved in every way the most satisfactory hence,

7. If feeding a bulky fodder along with meal to pigs is any aid to digestion, it must be given in a less proportion than that used in feeding the pigs in group 2 in this experiment.

The Feeding of Cows in the Stable on Green Food.—The object of this experiment was to ascertain the acreage of ground required to sustain one cow during the ordinary season of pasturage, when the food is given to the cow in the stable. Two cows were thus fed from June 10th to September 26th, a period of 108 days. The food was cut from the fields adjoining the stables and consisted of permanent grasses, red clover, lucerne, pease and oats, each being cut in its season. The acreage required to feed two cows for 108 days was 1.559 acres, or for one cow .779 acres. To feed one cow for 165 days, or 5½ months, the average term of pasturage would, therefore, require 1.190 acres. This fact is full of significance, as three acres of pasture are usually allowed for this purpose.

Rearing Grade Steers of Different Breeds.—This experiment was commenced during the winter of 1889-90. Grade calves by pure bred sires and out of common dams were secured of the following breeds :—

	Date of Birth.
Galloway	November 3rd, 1889.
Shorthorn	December 28th, 1889.
Aberdeen Angus Poll	January 1st, 1890.
Hereford	January 5th, 1890.
Devon	January 8th, 1890.
Holstein	February 17th, 1890.
Shorthorn	April 1st, 1890. (Fed on skim milk.)
Native or Scrub	April 16th, 1890.

The Shorthorn grade reared on skim milk was bred on the farm. The others were secured by purchase wherever they could be obtained of a suitable character. The dams, except in the case of the native, were good common cows, possessed of a good share (more or less) of Shorthorn blood. The sires in every instance were registered, except in the case of the native. The calves are all males. Those purchased reached the farm when but a few days old, except in the case of the Galloway, which was 53 days old when it arrived. It was donated to the farm by the breeder, W. Keough, Esq., Owen Sound. Up to the period of its arrival it had been raised upon the dam, and in the transition period, during which it was being taught to drink from the pail, it failed considerably in flesh. This so far detracts from the value of the experiment, but no other grade Galloway calf could be secured at the time.

They were all reared by the pail and were fed on whole milk until six months old. To this diet was added a ration made up of cut hay, timothy and clover, meal consisting of peas, oats and small wheat ground and bran in equal quantities, and green fodder, consisting of clover, peas and oats, when these were in season. After a time oil-cake was added. All the food given to them was carefully weighed and they also were weighed monthly. They were confined in loose box stalls until about six months old. They were then kept tied in double stalls and were allowed to exercise a short time daily in the yard.

It is proposed to keep them until they are two and a half years old and to confirm the experiment by repeating it again and again.

The objects of the experiment should be of great practical value. They include the following :—

1. To ascertain the cost of rearing calves on whole milk.

2. To ascertain the cost of rearing calves on skim milk.

3. To ascertain the cost of rearing calves on whole milk as compared with skim milk.

4. To ascertain the relative cost of rearing during different periods of growth.

5. To ascertain the relative increase in weight during the different periods of growth.

6. To ascertain the relative percentage of gain during different periods of growth in proportion to the food consumed.

7. To ascertain the cost of producing beef up to the age at which it is now most commonly marketed.

8. To ascertain the relative cost of rearing beef animals when fed on whole milk and skim milk respectively during the early stages of their growth.

9. To ascertain the relative value of grades of the beefing breeds and of the native breed, respectively, for beef production.

10. To ascertain the relative value of the different grades used in the experiment for beef production.

At six months old the weights of the different individual animals were :

Class of animal.	Weight, lb.	Gain per day, lb.
Galloway	457	2.54
Shorthorn	530	2.94
Aberdeen Angus Poll	485	2.69
Hereford	545	3.02
Devon	434	2.41
Holstein	535	2.97
Shorthorn (skim milk)	454	2.52
Native	386	2.14

When the calves have all reached the age of one year a bulletin will be issued with full particulars.

Stable Confinement in Calf Rearing.—In this experiment the object was to ascertain the effects of continued confinement on a young animal of the bovine tribes. An Ayrshire grade was put in a box stall, 11 ft. 6 in by 8 ft. 4 in., on 24th May when but four days old, and was so confined for 190 days. At the end of that period it had become so stiffened that it had to be removed and to be allowed exercise daily in the yard. It was fed on a ration of whole milk at first, then whole and skim milk, then skim milk, and as soon as it would eat was given in addition a ration of meal, hay, roots and green fodder. This ration was continued after removal from the stall. It required but two weeks under the changed conditions to entirely remove the stiffness. (See p. 200.)

Berkshire and Yorkshire Pigs.—This short contest was between a pure Berkshire and a Yorkshire boar. It commenced August 19th and ended December 19th, thus lasting four months. A pure Berkshire boar, farrowed June 18th and weighing 25 lbs., was put in one pen August 19th, and the same day a pure Yorkshire boar, farrowed July 4th and weighing 25½ lbs., was put in another The Berkshire was, therefore, ½ lb. less in weight than the Yorkshire at the commencement of the experiment though 16 days older than the latter. During the contest the Berkshire took 30 pounds more meal than the Yorkshire and gained 12½ pounds more in weight. When the experiment closed the Berkshire weighed 167 pounds and the improved Yorkshire 155 pounds. The food consisted of milk, meal and a few roots.

This experiment does not decide very much owing to its short duration and because there was but one animal in each contest and these were not castrated. It is but the introduction to other experiments in this line of much more import.

Grade Lambs Fattened on Rape.—As mentioned elsewhere 54 acres of rape were grown upon the farm. It was our intention to purchase the lambs for feeding off the rape during August, but for reasons which need not be given here we were quite unable to do so. This fact is to me at least a matter of much regret, for had it been in our power to purchase these lambs in the first half of August I am satisfied that our profits on the venture would have been from $100 to $300 more than we realised.

As soon as we were in a position to purchase, the farm foreman set out to buy the lambs in our own and in the neighbouring counties. He became convinced at length that it was hopeless to try and secure them in sufficient numbers in these localities and at prices which we would be justified in paying. Immediately after the McKinley Act was passed dealers at once secured nearly all the lambs available in the localities where they are grown in best form. A search of many days resulted in the purchase of 48 lambs all told and 17 steers. The latter cost $47.50 per head and weighed 1,250 pounds some 10 days after they were brought home. The 48 lambs had been put on the rape during the declining days of September.

The foreman then visited the counties of Lanark and Carleton and purchased 344 grade lambs and ewes (32 of the latter), which reached the farm October 4th and were at once put on the rape.

We then decided that the number was insufficient to feed off all the rape, applied for a fresh grant, obtained it with a commendable promptness and then secured 145 more lambs near Pontypool, in the county of Durham. These reached the farm on the 18th of October, and were at once put upon the rape.

One hundred and three of these lambs (ewes and wethers) were then selected and shorn early in October, with the object in view of preparing them for shipment to Britain. It has been stated by those who should be able to give an opinion of much value that if the fleece be removed in the autumn that the animal thus shorn will not only feed better but also ship better than one not so treated. We wish therefore to test the correctness of this theory. We would much rather have had the shearing done about September 1st, had we been in a position to do this. The wool would then afford better protection in winter.

This lot was kept in at night after the shearing and were only allowed to feed on the rape during days of favorable weather. They are now being fed on a ration of hay, meal and roots.

The wool shorn from them and from the lot referred to below averaged about 4 lb. per fleece unwashed and brought 13 cents per pound.

On December 2nd, a lot of 20 lambs was selected and of these 10 were shorn. The two lots will be pitted against each other during the winter in a feeding contest.

The following is a summarized statement of the cost of these lambs and of the net return received for them including the value of those now on hand.

Net Cost of 537 Lambs and Ewes.

505 Grade lambs averaging $3.33½ each	$ 1,684 17	
32 " ewes " $4.22½ each	135 20	
Cash paid in purchasing	$ 1,819 37	
Expenditure in buying	54 80	
Freight on 344 lambs (2 cars) from Pakenham to Guelph.	115 20	
Freight on 145 lambs from Pontypool to Guelph	31 20	
Expenses in purchasing	$201 20	
Net cost of 537 ewes and lambs		$2,020 57

Net Returns From 537 Lambs and Ewes.

Dec. 1st 1890, sold 32 ewes @ $5.64 to farmers in neighborhood	$ 180 50
" 19th, 364 lambs shipped to Buffalo, weight, 35,915 lb., @ $5.62 per 100 lb. live weight	2,018 43
" " For seven lambs slaughtered and 11 pelts	26 75
" " 471 lbs. wool @ 13 cts.	61 23
Net cash return	$2,286 91

Value of Lambs on Hand.

Dec. 24th, value of 101 lambs, weight 10,100 lb., @ 5 cts. per pound live weight	$505 00
Dec. 29th, value of 20 lambs, weight 2,000 lb., @ 5 cts. per pound live weight	100 00
	$605 00

Net return for 537 lambs and ewes 31st Dec. 1890, including value of those on hand		$2,891 91
Average price paid for each lamb delivered at Guelph	$ 3 76	
Average price received for those shipped to Buffalo	5 54	
Net profit on the whole transaction up to Dec. 31st, 1890.	871 34	
Net profit on each lamb up to Dec. 31st	1 62	

Some twenty-one lambs were lost from the causes stated below:

Strayed	1
Died from bloating	2
Killed by fighting	2
Died from staggers	3
Found dead on back	2
Died from inflammation of lungs and bowels	3
Sent to butcher on first symptoms of dizziness	7
Killed in car	1
Total	21

The loss was of course charged against the lambs. This is one of the difficulties attendant on rape pastured with lambs. Some suffer from scours which if unchecked leads to fatal disorders. The preventives are a grain ration and abundance of salt to which they have access at all times.

They were left on the rape until 1st December, when they were then fed in sheds, getting a ration of hay and grain, consisting of whole pease and oats until they were shipped.

The weather was unfavorable owing to the unusual amount of rain. Sleet storms and heavy cold rains coming on in the night were no doubt the primary cause of some of the losses indicated above.

Our experience this year confirms the opinion that unless farmers attend to the castration and docking of their lambs, the males which are thus neglected will soon cease to be bought for feeding purposes. They evidently do not fatten so readily, they are very restless. and spend too much time in punching each other, are difficult to sell to the shipper, and do not realise so good a price. It is my conviction that the time is at hand when $1.00 per head more will be paid for good wethers than for rams of equal quality.

THE LIVE STOCK OF THE FARM.

The condition of the live stock of the farm during the year 1890 was on the whole satisfactory. The returns from the same were almost the only returns that we received from any quarter. The losses from disease were certainly reduced to a minimum in the case of horses, cattle and swine. The same is not true of pure bred sheep as will be seen below.

Horses.—The horses were kept in fair condition notwithstanding the constancy of the work. Some attention was this year given to breeding. In the month of April the first heavy draught foal came to hand that was ever bred on the farm. On the 24th of December there was another arrival, also a heavy draught. The aim at present is to have the colts come in the autumn with the object (1) of testing the wisdom and practicability of rearing autumn foals and (2) to enable the dams to rear the foals during the season of slack work. We had no losses from deaths during the year.

Cattle.—Our success with cattle during the year has been almost without parallel This is all the more noticeable because of the fact that in former years this farm has not been more than ordinarily free from the ravages of disease. Tuberculosis and abortion have both held high carnival here, and they may do so again, but at present the live stock of all classes is apparently entirely free from disease in any form. But one matured bovine was lost during the year and only one calf belonging to the farm proper. The former was valued at $40 and the latter at $10. Another calf was killed by way of experiment to ascertain the effects of suckling a young animal on a dam affected with tuberculosis. The matured animal which was lost was a high grade Ayrshire cow. She was purchased as a milker in October, 1889. At the time of purchase she was giving a good flow of milk, was in fair condition and from external appearances no suspicion could possibly be aroused. She was then giving a large flow of milk and was for the time being the sole dependence of a whole household for their milk supply. For reasons which may not be stated here she was not brought to our stables until more than four weeks had elapsed after the purchase had been made. When she arrived it was at once apparent that she had been considerably reduced in flesh, but was still giving a good flow of milk. There was also a dryness of the hair noticeable and a lack of lustre in the eye which was ominous. Fortunately her milk was not used by the college in a single instance as a robust grade Angus calf was given her to nurse the day she came home. In the face of a full and nourishing ration she became still further reduced in flesh. After time a hacking cough manifested itself. Tuberculosis was suspected and in the month of April she was killed in the class room under the supervision of Dr. Grenside who conducted the post-mortem in the presence of the students and with the result that tuberculosis in one of its worst forms was found present as stated in this report. The grade Angus calf which had sucked the cow until the time of her death and which was then about four months old was isolated and fed by hand until October following when it was also killed in the presence of the students. Tuberculosis had also become developed in a marked degree in the calf as described by Dr. Grenside in the same report. The lesson here is one of great significance and is well worthy of the attention of scientists in every land. The alarming feature of this disease is its insidious nature. It could not be certainly known even by an expert that the calf was assuredly diseased on the morning on which it was slaughtered. It is because of the stealthy way in which its advances are made, that tuberculosis has come to be the greatest scourge of the North American continent amongst the bovine tribes. The calf which was lost and is referred to above as belonging to the farm proper had some affection of the lungs but no indications of tuberculosis was found in the post-mortem. It was simply a case of decline from the effect of a contraction of cold. The cow cost $40. and the calf was worth about $10. A Galloway cow met with an accident in a joint of one leg and was marked down $50 at the annual stock taking. A shorthorn heifer carefully purchased failed to breed and was marked down $10 the difference between the buying and selling value. A pure Angus bull-calf developed unwelcome scurs and was castrated, which however, did not represent a loss so much as a failure to realize a profit. A Galloway bull-calf developed undesirable shapes in a breeding animal and was cut down in value in the annual estimate $18.43. A Jersey cow failed to breed and was also reduced in price $50. A Devon cow not breeding at present was reduced in value $40 although she may yet breed, and two aged bulls sold, an Ayrshire and a Devon realized together $28 less than they were valued at at the commencement of the year. The total value of the pure bred cattle on the farm at the end of 1890 was $5,086.57, of grade cattle $1,894.40 and of horses $2,035. This gives the value of the cattle and horses as $8,993.97. The total loss therefore from death during the year from stock valued at $9,015.97 was only $50. This is a result almost without parallel in the management of live stock, and affords much ground for thankfulness. It is doubtless a result which never before was attained in the history of this farm and in all probability will never be realised again. It reflects much credit on the care and skill of Mr. John Harvey, the cattleman in charge.

It will be remembered that in 1889 two cows were lost from milk fever. Since that time we have taken the precaution to keep the cow in a box stall for some time before calving, and on a ration which is non-stimulating and non-milk producing. After parturition she is given a purgative in the form of one pound of Epsom salts.

Sheep.—The same fortunate record cannot be given regarding the sheep, especially the pure breds. To say that they have done badly is putting it mildly. They wintered well. The crop of lambs were both vigorous and abundant. From 26 breeding ewes

42 lambs were dropped, some few were lost when quite young, but only a small number. When turned out on pasture they made an excellent showing. Some of them soon began to dwindle; now and then one would be found dead in the morning. An examination revealed one form of inflammation or another. At one time it would be in the bowels at another in the lungs. The losses were during the year. The full reasons for the various forms of decline and death which overtook them have not all been ascertained, and with the light that we now have may not be ascertained. This much is clear, that during the two years that the pure bred sheep have been under my supervision they have not done well, not much better, if any, than during the preceding years.

I would fain give all the reasons for this if I could. Much of the soil on the farm is low and produces a grass that is rank and strong, just such grass as is not good for young lambs. It is vain to urge a drainage that will render it impossible for such grass to grow until the elements of nature shall so remould the farm that this will be possible. It is idle to urge that the sheep should be kept on higher land on a farm without one field that has not one or more of those low spots in it which are so fruitful in the elements of sheep producing disorders. It will not avail to argue that good sheep were reared on this farm long years ago, for then the morasses had not been cleared, and as a consequence were completely avoided by the sheep. It should not afford satisfaction to any one to say that sheep do well on adjoining farms, for there are few farms indeed which have no fields without low damp spots in them. I hope that we may in coming years be able to present a more favorable report, but to me at least the outlook is not very encouraging. To those who argue in the meantime that an experimental station should be able to overcome all impediments and obstacles in the way of success, I answer that we will do this just as soon as the unalterable laws of nature that relate to sheep breeding become changed or cease to operate.

Some of the breeds gave better returns than the others, as was to be expected. Adaptability produced effects that were to be looked for. The Southdowns, which are among the lighter breeds and, therefore, better adapted to drier lands, gave the least satisfactory all round results. The Leicester seemed best to withstand the vicissitudes which overtook the sheep. The Dorset-horned came next to the Leicester. They are a decidedly prolific and hardy race of sheep and will in all probability play an important part in the production of early lambs for the Easter markets. It has not yet been fully demonstrated that they will continue to produce two crops of lambs as in England, nor has it been proved that they will continue to breed in autumn at the exact time desired. If experience demonstrates that the Dorset horned breed will produce even one crop of lambs in the late autumn, they will soon become more generally introduced. In that case the lambs could be sold at Easter for high prices, and the dams could also be turned off if desired for the spring markets. We expect much from the Dorsets. They are not only decidedly hardy and prolific, but are of fair size and gentle disposition. The wool is medium and the yield is fair. It may turn out that some grades of mutton are better. If so, a dark-faced ram may be used in crossing. The highest prices have been realised for Shropshires, next to these come the Oxfords.

Notwithstanding our losses with pure-bred sheep, the balance sheet is on the right side. The receipts over the outlay were $219.46 for the year, that is to say, when the inventory of December 31st, 1889, is compared with that of 1890, purchases, sales, losses and deduction in values all being considered, the sum named above shows the profits from the pure-bred sheep, when the food is not taken into account.

Sheep which are brought to the farm for fattening purposes during the later months of the year seem to do remarkably well. This will be at once apparent from the report given regarding this class of sheep, which begins on page 94.

Swine.—The most profitable class of live stock kept on the farm this year was swine. We had but two pure breeds, viz., the Improved Yorkshire and the Berkshire, and in addition a limited number of Berkshire grades. One young Yorkshire sow was on the farm at the commencement of the year and one young boar. Five young sows were imported from England in the month of June at an average outlay of $85 each, including the cost of purchase and carriage. We had five pure Berkshire sows and one boar, of which one sow was sold at the sale. The two Berkshire grade sows were kept for experimental purposes.

From our limited experience in growing Berkshires and Improved Yorkshires under the same conditions we are not able to throw any light upon the much controverted subject of their comparative merits as pork producers. It would not be safe even to forecast conclusions on this score. Of this we are sure, that both breeds have given excellent results for breeding purposes.

Of the sows which we now have, the Yorkshires seem to require more food to keep them in condition and the same is true of the boars. The Yorkshires are decidedly more prolific. The six litters comprised 54 pigs, the sows in every case being young. The five litters from the Berkshires produced 32 pigs, only two of which were from young sows. The 24 young Yorkshires sold at the sale averaged $10.88 each. The 21 Berkshires averaged $10.95, but the latter were somewhat older. The highest return from one litter of Berkshires was $111. The highest return from one litter of Yorkshires was $112. The total gain on the Yorkshires during the year was $450.25 ; the total gain on the Berkshires was $359. This does not include the food. The sum received for pork sold to the dealer on foot during the year was $441.30. The total gains from pigs during the year was $1,150.55, which, however does not take any of the food into account, except the refuse of the college, for which $60 is allowed for the year.

The losses of swine were light. Some were lost when the litters were young from the over-lying of the dams, as is so frequently the case, but no active disease of any kind was present during the year. The statement which is brought out elsewhere should be borne in mind—the profits on the pork which was sold on foot before October were much higher relatively than those received on pork sold after that date.

FINANCIAL STATEMENT OF THE ONTARIO EXPERIMENTAL FARM FOR THE YEAR ENDING 31st DECEMBER, 1890.

At the commencement of the year it was decided to keep an account of the receipts and expenditures which might justly be charged to farm proper, that the farmers of this province might be furnished with an approximate statement of the exact financial standing of the farm proper at the close of the year, separate from all the other departments. Before taking stock at the commencement of the year I requested of the Minister that he should name some competent person who would assist in stock-taking, both at the beginning and the end of the year, who would also examine into the method of keeping the accounts, and who would in fact, do the work of an auditor. The gentleman appointed was John I. Hobson, Esq., of Mosborough.

An inventory of all live stock and implements was therefore taken at the commencement of the year. This inventory will be found in the annual report of the farm foreman for 1889. The value put upon the crop grown that year will also be found in the same report. In keeping this account which involved a great deal of labour, the mode of procedure was as stated below :

The farm was charged with :

(1) A proportion of the salary of the farm foreman, mechanical foreman, three-fourths of the salary of the cattle manager and one-fourth that of the farm instructor. The portion of the salary of the parties just enumerated not charged to the farm was set to the account of the Educational and Experimental Departments.

(2) All wages paid for work done on farm proper, whether of men or teams.

(3) All wages paid for student labor done on farm proper, although the wages so paid for work done under the head of permanent improvements, whether of students, men or teams, was deducted from this sum by a contra entry.

(4) All other running expenses whatever as food for stock, seed grain, blacksmithing, repairs, etc.

(5) Cash paid for implements purchased.

(6) Cash paid for live stock purchased.

(7) Cash paid for permanent improvements (see item 5 below under head of expenditure p. 136.) This, however, was all deducted by a contra entry.

(8) Cash paid for educational purposes in connection with the work of the professor of agriculture (see item 6 below under the head of expenditure p. 136). The larger proportion of this also was deducted by a contra entry, the reasons for which will be manifest.

(9) Cash paid for experimental purposes, (see item 7 under the head of expenditure, p. 136).

There was placed to the credit of the farm :

(1) All moneys received from the sale of produce and live stock which went off the farm.

(2) Cash, supplies and labor expended on other departments including College, Experimental, Educational, Horticultural and Dairy Departments and also permanent and temporary improvements.

(3) Increase in the value of live stock, less the decrease in the value of the same.

(4) Increase in the value of the field produce.

(5) Increase in the value of the implements. (See p. 137).

At the end of the year an inventory was again taken in the presence of Mr. Hobson, of the live stock and implements. This inventory and also the valuation of the farm crops grown are given in the report of the farm foreman (see pp. 139-152). The labor done was charged every evening against the proper department and the statement of receipts and expenditures were taken from the monthly rendering of the Bursar's accounts, so that nothing was guessed at or done at hap-hazard. Mr. Hobson examined with minute care the financial statement, and expressed himself as quite satisfied with the equity of the plan adopted in keeping the accounts. This financial statement might have been given in a form more in consonance with the usages of the most approved methods of book-keeping, but the object aimed at was to furnish a simple statement that anyone would understand. (See letter of Mr. Hobson on p. 138.)

EXPENDITURE.

1. *Salaries and wages—*		
(1) Proportion of salary of farm foreman charged to farm proper	$450 00	
(2) Proportion of salary of the mechanical foreman charged to farm proper	100 00	
(3) Proportion of salary of feeder charged to farm proper	300 00	
(4) Farm instructor	100 00	
(5) Wages paid to hired help by farm	2,137 65	
(6) Wages paid to students for labour	1,995 05	
		$5,082 70
2. Running expenses, feed for stock, seed grain, blacksmith bill, repairs, etc.	$1,728 81	
3. Cash paid for implements purchased	397 00	

4. *Cash paid for live stock purchased—*

(1) Horses	465 00	
(2) Hereford cattle	254 60	
(3) Ayrshire cattle	176 50	
(4) Devon cattle	140 00	
(5) Holstein cattle	801 00	
(6) Jersey cattle (registration fees)	3 10	
(7) Shorthorn cattle "	5 25	
(8) Grade cattle	1,413 50	
(9) Pigs	620 51	
(10) Sheep	2,051 80	
		$5,931 26

5. *Cash paid for permanent improvements—*

Lumber, wire for fencing, nails, etc	725 51

6. *Cash paid for Educational Purposes—*

(1) Fuel, light, etc., for Prof. of Agriculture (2) Printing, stationery, postage, etc., $50 of this charged against farm (see item 4 under the head of Revenue)	345 74

7. *Cash paid for Experimental purposes—*

(1) Repairs, sundry travelling expenses, etc (2) Expenses and pay of board of management	195 52
Net gain	1,709 25
	$16,115 79

REVENUE.

1. *Cash—*

(1) Farm produce, hay, grain, etc	$442 14	
(2) Horse sold	100 00	
(3) Hereford cattle	117 00	
(4) Galloway cattle	146 30	
(5) Aberdeen Angus cattle	124 90	
(6) Ayrshire cattle	92 20	
(7) Devon cattle	119 70	
(8) Holstein cattle	383 09	
(9) Jersey cattle	112 00	
(10) Shorthorn cattle	322 91	
(11) Grade cattle	1,526 15	
(12) Pigs	1,116 53	
(13) Sheep	3,151 53	
		$7,754 48

2. *Cash, supplies and labor expended on other departments—*

(1) College, milk	697 55	
Food for College horse	75 00	
Food for Bursar's horse	75 00	
Labor, drawing ice, etc	181 82	
	$1,029 37	
Less refuse from College	60 00	
		$969 37
(2) Permanent improvements, cash (see expenditure item 5)	$725 51	
Labor of students and teams on public and private roads	497 46	
		$1,222 97

(3) Experimental Department—Cash, see expenditure item 7		$195 52	
Labor of students and teams		419 47	
Food for horses		140 00	
			$754 99
(4) Educational Department—Food fed to stock, bulls and rams (see explanation 5 on p. 138)		$373 44	
Care of same		79 69	
Depreciation in value of stock bulls and rams		63 00	
Labor of students (instruction), see explanation 5 on p. 97		31 31	
Cash $345.74, less $50, see expenditure, item 6		295 74	
			$843 18
(5) Temporary Improvements—Labor spent on cleaning roads and grounds around the buildings, farm, office work, attending on visitors, etc			343 34
(6) Horticultural Department—Food for two horses and colt, etc			182 00
(7) Dairy Department—Labour of drawing ice, straw, etc			117 45
3. *Increase in value of live stock—*			
(1) Horses		$380 00	
(2) Hereford cattle		200 00	
(3) Ayrshire cattle		165 00	
(4) Devon cattle		25 00	
(5) Holstein cattle		675 00	
(6) Jersey cattle		75 00	
(7) Shorthorn cattle		70 00	
(8) Grade cattle		748 40	
(9) Pigs		639 00	
(10) Sheep		190 00	
		$3,167 40	
Less decrease in value of Galloway cattle	$118 43		
Aberdeen Angus cattle	30 00		
		$148 43	
			$3,018 97
4. *Increase in value of produce, grain, hay, straw, roots, etc*			580 24
5. *Increase in value of implements* (a number were donated)			328 80
			$16,115 79

I now desire to call attention to the following explanations and observations regarding the financial statement just submitted:

(1) The charge made for labor expended on the other departments of the institution was exactly the amount paid to the workmen and students, as the labor was all hired. Team labor was charged at the rate of $3 per day for man and team.

(2) It may be argued that the cash expended on permanent improvements (see item (2) under the head of revenue) should not be all deducted from the net expenditure of the farm, or in other words that part of it should be charged against the farm. Ordinarily this should be done, and perhaps it would have been more equitable to have so charged it this year, but a large portion of this expenditure was incurred for requirements which an ordinary farm would not want. As an offset to this expenditure the improvement of the condition of the farm may be placed. This in the item of weed destruction alone would amount to several hundreds of dollars for the year. One hundred and eight acres were virtually cleaned from a foul condition, and the farm is not credited with this or with any other improvement.

(3) Under the head of temporary improvements (see item 5) of revenue, the farm

is credited with $343.34 Possibly some of this should have been charged against the farm, but not much of it, as the extra labor entailed because of our relations to the public is very considerable. We have visitors in large numbers, and we are glad to have them. They require a guide, and this entails outlay which the farm proper should not bear.

(4) Let it be observed, however, that although the amounts credited as permanent mprovements, $725.51, labor of students, men and teams on public and private roads, $497.46, and temporary improvements, $343.34, be added, which gives us $1,566.31, and though this whole sum be charged to the farm, we have still a balance of $143.21 in favor of the farm.

(5) We require to keep stock bulls and rams representing a large number of breeds for educational purposes. We estimated that three-fourths of the cost of the keep of these animals, and of the labor of caring for them should be charged as revenue for the farm (see item 2, (4) under the head of revenue). The animals require to be fed and cared for quite as much as though a full herd or flock of females were kept. The small item of $31.31, charged as labor of students (see item 2, (4) under the head of revenue), arises from loss of time on the part of a number of students attending on machine work, as threshing, etc , while one or other of the number is receiving instruction in such work as eeding the same.

(6) The decrease in values was carefully noted, and was deducted in every instance, whether it applies to live stock or to farm implements.

(7) It may be objected that it is not sufficiently accurate to value the crop grown one year and also that grown another year, and to charge the difference as a revenue or an expenditure for that year. I ask in what way can this be better done? It does not afford a sufficient answer to say that stock should be taken of the crop on hand at the end of the year, for this cannot be done with grain part threshed and part unthreshed, and hay and straw scattered in mows part used and part unused, only in an approximate way. The only real difficulty about our method would arise from a material difference in the amounts of food on hand at the end of the year. But even this difference would in no way affect the accounts for a term of years, although it would affect them for one year. This year a careful calculation has fixed the amount of food on hand December, 31st, 1890, as about equal to the amount on hand 1st January, 1891.

(8) It will be observed that our cash revenue is derived almost entirely from live stock and live stock products sold. Had our dependence been solely or principally on the sale of field produce we would certainly have failed to show any revenue. The methods which we adopted in working the farm are such as may be followed by any farmer. We obtained no extravagant prices for pure bred stock, and a large portion of the return came from meat production.

(9) The balance in favor of the farm is $1,709.25. The size of the farm is 550 acres, of which, say 400 (an approximation) are arable This is a rental of $3.10 per acre for the whole farm, or for the cultivable portion of $4.27.

(10) It will be observed that there is a difference in the statement of the revenue and expenditure here as compared with the financial statement in Part I. of this report. This difference amounts to some thousands of dollars. It arises mainly from the fact that the farm there, is not credited with supplies furnished by it to the other department, and labor done for the same nor is it credited with any increase in the value of stock.

The following statement bearing date of January 9th, 1891, was forwarded by Mr. Hobson with the permission to have it appended to the financial statement given above:

Prof. SHAW,

DEAR SIR,—Regarding the accounts it appears to me that they are all right. I do not know that we could apportion them more fairly with perhaps the exception of the amounts charged to temporary improvements. As I understand it a good deal of similar work would require to be done in every well managed farm. However, supposing that to be the case, I am inclined to think that the general improvement of the farm which no credit is taken for in the accounts is enough to offset the items referred to.

Yours respectfully.

JOHN I. HOBSON.

Difficulties in the way.—The difficulties in the way of making the farm pay its way are much greater than appear on the surface to an ordinary observer. The chief of these is connected in one way or another with the question of labor. The work-hands must pay $3.00 a week for board, and washing extra, hence the labor employed is more costly than with the ordinary farmer. Then the student labor cannot be utilized in every instance to the best advantage, owing (1) to its irregularity, as in time of examinations and vacations; (2) to the fact that a large share of it comes at a time of the year when it is not of most value, and (3) to the difficulty of employing a number of persons on many kinds of farm work, to the same advantage as one could be employed.

Will this effort be repeated.—I cannot answer that here. That is not for me to decide, I can only say that I hope it will from year to year. I do not undertake to make the farm proper pay its way every year, but I do think it should be made to pay its way during an average of years.

I feel that I would be recreant to duty if this report were brought to a close without expressing the complete satisfaction given me by faithful assistants in each department, and by the industry and fidelity shown in the work of the farm both on the part of the students and the work-hands.

I have the honor to be, sir,
Your obedient servant,
THOMAS SHAW.

REPORT OF FARM FOREMAN.

To Prof. THOS. SHAW,

SIR, I have the honor of presenting to you my fourth annual report of the department which it is my duty to oversee.

I am pleased to say that notwithstanding the unfavorable season we experienced, especially as regards our grain crop, that on the whole I consider it the most prosperous year upon which I have had the honor to report.

The instructions received by the students in the practical work of the farm has received as much attention as it is in my power to afford them, but considering that we are still dependent on one team to give instruction on plowing to a class of about 90 students, you must see that the means for that object is not sufficient. We must also bear in mind that the instructor is also expected to run the farm engine which drives the thresher, chopping-mill, cutting boxes and root pulper, and these require to be run at least two afternoons in the week.

During the months of February and March we have ample time to instruct the students in the management and running of the different machines just named. An evidence of this is shown by the able manner in which the majority of the students acquitted themselves in the practical examinations last June.

I am pleased to call your attention to the fact that notwithstanding the decrease of $600.00 in the wages paid to the students, I have found them the most industrious and practical class that I have had the pleasure of overseeing since my coming here, and more work has been accomplished by them.

A large share of student's labor, together with a great deal of the same, from the regular farm hands and farm teams has been utilized in the making of roads in and around the farm.

The amount expended on labor done by the students for this work amounts to $832.00, while the work done by the farm men and horses for roads and other departments amounts to $661.85.

CROPPING.

Owing to the excessive rains which fell in the month of June, our grain crops are certainly below the average.

The crops sown on the low lying ground were injured somewhat by the wet, while those sown on the rolling land were washed off by the continuous heavy thunder showers.

On the other hand our hay crop was above the average, and as there was bright weather for curing it, the principal part came in in good shape.

The following is a list of the field crops as closely as I can estimate :

Field No. 1.—As I stated in my report of 1889, this field was plowed from sod (in the month of September) and sown with rye 2½ bushels per acre. The crop looked rather delicate last spring but afterwards turned out a fair crop.

On the 16th June we commenced cutting, at which time it had attained a height of about 5 feet six inches but showed no signs of maturity.

We cut it with the binder, made large sheaves and shocked it up, and immediately commenced hauling it to the silo, passed it through the ensilage cutter and tramped it tight into the silo.

Six weeks later we opened the silo and commenced feeding it to milch cows, calves and store cattle, all of which ate it with avidity and did well while being fed on it. The return from this field, therefore, in rye is put at 60 tons of ensilage at $1.50 per ton—$90.

When the rye crop was cleared off we immediately plowed the field, harrowed and rolled it and made it into light drills about 23 inches apart and sowed with dwarf Essex rape.

After the rape came up we kept it clean by passing the horse-hoe through as many times as it was possible to do this. A part of it was gone over a fifth time, and the whole of it had four cultivatings.

The rape crop was pastured off by turning on a flock of 505 ordinary grade lambs, purchased in the eastern part of the province, and 32 aged ewes.

The rape crop of fields No. 16 and No. 18 were also pastured off by this flock of lambs.

The lambs and sheep were purchased at a cost of $3.76 per head. This price includes cost of gathering, freight and all expenses in connection with the transaction.

They were turned on at three different dates, viz., 48 in the last week of September, 344 on the 5th of October, and the balance on the 16th of October. A range of small troughs were made to allow them all to feed comfortably by nailing two 6-inch boards together, and each day they were fed some oats.

There is not much danger of overfeeding with oats, as lambs eat very little grain when feeding on rape, and we found that a few of them never eat any oats at all.

The total cost of 537 ewes and lambs purchased by me when delivered at Guelph, including all expenses, was........	$2,020 57
The value of the lambs on 31st December, including money received for those sold, was...........................	2,891 91
Total gain at that date	871 34

At the time the lambs were taken to the sheds about seven acres of the rape remained untouched ; but it is a difficult matter to calculate how many lambs a field of rape will feed, as a great deal depends on the time that winter may set in.

Field No. 2.—This field contains 17 acres; of which ten acres on the east side were hurdled off to pasture the cows kept by the experimental dairy department, a sum of $4 per acre being charged to that department for pasturage. The balance of the field, seven acres, was meadow and gave a crop of hay yielding 2½ tons per acre.

17½ tons clover @ $6 per ton.........................	$105 00
Pasturage, 10 acres @ $4..................................	40 00
	$145 00

Field No. 3.—This field contains 20 acres ; four acres of which is used by the experimental department in small grain plots. Four acres of a gravel hill on the west side have been planted to trees by the horticultural department. The remaining 12 acres were sown with common six-rowed barley, yielding 19½ bushels per acre.

234 bushels @ 50 cents.................................	$117 00
12½ tons straw @ $1.50.............................	18 75
	$135 75

Field Nos. 4 and 5.—This field, being one-half of two fields proper, contains 20 acres the balance of No. 4 being partly planted to trees by the horticultural department, and a part of it, known as the paddock, was used by the experimental dairy department as pasture. It contains

3 acres @ $4	$12 00

Field known as 4 and 5 was used as the root field this year, from which the following root crops were taken :

1 acre	white vosges carrots, 600 bushels @ 11 5-6 cents				$ 71 00
1 "	sugar beets, 9½ tons @ $4.25				40 37
7 "	mangolds, 300 bush. per acre,	2,100 bush.	@	8 cents	168 00
3 "	potatoes, 154⅔	"	464 "	45 "	208 80
8 "	turnips, 440	"	3,520 "	8 "	281 60
	Total crop				$781 77

The balance of field No. 5 is woodland.

Field No. 6.—This field contains 20 acres, and was meadow, of a mixture of timothy, rye grass, tall oat grass, and lucerne and alsike clover. It yielded 2¾ tons per acre.

55 tons @ $6	$330 00

Field No. 7 contains 20 acres; this field was plowed from sod in the fall of November, 1889, and on the 19th of April was sown with New Zealand oats. About the 18th of June it was struck with a blight, after which it never did well. It yielded 17 bushels per acre.

340 bushels @ 40 cents	$136 00
10 tons straw @ $2.50	25 00
Total	$161 00

Field No. 8 contains 20 acres, and was meadow yielding 2¾ tons per acre.

55 tons @ $6 per ton	$330 00

Field No. 9.—This field also contains 20 acres, and was this year given to the experimental department for the purpose of testing plots of one acre, one-half acre and one-quarter acre each. The yields from these plots were as follows :—

281 bushels oats @ 40 cents	$112 40
54 " spring wheat @ 90 cents	48 60
127 " barley at 50 cents	63 50
17 tons of straw @ $1.50	25 50
Total	$250 00

This field was skimmed over with the two-furrow plows as soon as the crop was cleared off and afterwards plowed deep with single furrow plows.

Field No 10.—This field contains 20 acres, about one acre of which is taken up with the creamery and stables for dairy cattle, and about five acres are used by the horticultural department as an orchard and for growing small fruits.

The remaining 14 acres were sown with common six-rowed barley and seeded with grasses and clovers of the following mixture per acre :—

5 lbs. timothy,
1 " rye grass,
1 " tall oat grass,
2 lbs. lucerne clover,
2 " large late clover,
1 " alsike.

The barley yielded 21 bushels per acre.

294 bushels @ 50 cents per bush	$147 00
12 tons straw @ $1.50	18 00
Total	$165 00

Field No. 11.—This field contains 20 acres and was cropped as follows: 13 acres of winter wheat, which yielded a very small crop and only of medium quality.

Garfield wheat, 3½ acres, 28 bushels @ 91 cents	$25 48
Bonnell " " 24 " "	21 84
Mediterranean hybrid, 3½ acres, 23 bushels @ 91 cents.....	20 93
Surprise, 2½ acres, 11 bushels @ 91 cents......	10 01
26 tons straw @ $1..................................	26 00
Egyptian oats, 2 acres, 32 bushels @ 40 cents............	12 80
New Zealand oats, 2½ acres, 52½ bushels @ 40 cents........	21 00
Bavarian " " 65 " "	15 00
10⅙ tons straw @ $1.75...........................	17 81
Total.............................	$180 87

This field was skimmed with the two-furrow plows as soon as the crop was taken off and the 13 acres of winter wheat ground was sown with rape. The seed was scattered broadcast by hand and rolled. The dry season retarded its growth, but the pasturage furnished was worth a great deal to our young stock. After it was pastured off we plowed the field about eight inches deep and then manured it in preparation for root crop next season.

Field No. 12 contains 20 acres and was handed over to the experimental dairy department last spring to be cropped with corn for experimental purposes, and for the purpose of making ensilage, the manager of that department agreeing to fill the farm silo as a rental for the field. A swamp laying near the centre of this field failed to produce corn and was again plowed up and millet sown on it.

The yield from this field was as follows:

Millet, 2 tons at $5.00	$10 00
Corn ensilage, 50 tons at $1.50	75 00
Total.........	$85 00

The field was plowed with single furrow plow after corn crop was removed. The farm teams prepared the field in the spring and hauled the corn to silo in the fall.

Field No. 13 contains 20 acres four of which was planted with fruit trees last spring by the horticultural department. The balance, 16 acres was meadow yielding 2 tons per acre.

32½ tons hay at $6.00	$195 00

Field No. 14. This field contains 24 acres, 17 of which are used by the experimental department. The balance, 7 acres were meadow and yielded 2½ tons per acre.

17½ tons at $6.00	$105 00
Pasture 14 cows one month for dairy department at $1.00..	14 00
Total	$119 00

Field No. 15 contains 20 acres. It was laid down to permanent pasture in 1884 and it still holds out as the best pasture field on the farm.

Field No. 16 contains 26 acres and was sown with rye 2½ bushels per acre in Oct., 1889. The crop was pastured off last May and June by cattle and sheep.

On June 17, we commenced ploughing it and immediately followed by harrowing, rolling, drilling and sowing with rape, 1½ lbs. per acre. The crop was pastured off by sheep mentioned in report of field No. 1.

Field No. 17. This field contains 17 acres and was cropped as follows: 2½ acres corn for Experimental Dairy Department

3 acres green fodder, oats, tares, and green peas valued at $15.00 per acre	$45 00
3 acres which was allowed to mature at $8.00	24 00
3 " millet, one ton per acre at $5.00	15 00
2 " potatoes, 160 bush. at 45c	72 00

Two acres of this field was used by the Experimental department for the purpose of testing various kinds of roots. The root crop was as follows:

White turnips, 300 bushels at 6c	18 00
Mangolds, 133 bushels at 8c.	10 64
Carrots, 161 bushels at 12c	19 32
Potatoes, 163 bushels at 45c	73 35
Total revenue	$277 31

Field No. 18. This field contains 13 acres and was manured this year preparatory to its becoming the experimental field proper. The bulk of the manure was hauled from the city last winter by the farm teams and piled in low flat piles so as to destroy all foul seeds. This was carted and spread in the latter part of July and first week of August and plowed under on 8 acres on west end of the field. It was immediately harrowed and drilled and sown with rape.

The rape was a good crop and was pastured off by sheep, referred to in my report of field No. 1.

Field No. 19. This field contains 30 acres and was cropped as follows:

10 acres tares yielding 5 bushels per acre, 50 bushels at $1.50	$75 00
5 tons tare straw at $1.00 per ton	5 00

3 acres of Mummy peas partly threshed, and estimated at 25 bushels per acre.

75 bushels at 80 cts	60 00

17 acres Prussian blue peas not yet threshed, estimated at 20 bushels per acre.

340 bushels at 64 cts	217 60
20 tons straw at $1.25	25 00
Total	$382 60

Field No. 20. This field lays at the north side of the farm and has been in a wild state until this year. A portion of it is swamp thickly wooded and part of it is cleared. Last spring we hauled rails and made a high strong rail fence between No. 20 and No. 19. On the 25th of May, several head of store cattle were driven into this field and found ample pasture up to the 10th of July, when we were obliged to remove the stock, as the swamp had dried up and the want of water compelled us to drive them to No. 15.

I may here say that it is necessary to have a well dug and a windmill set up in No. 20, as the pasture is to a certain extent wasted for want of water.

Field No. 21. This field contains 13 acres and was sown with oats of 3 varieties as follows:

2½ acres white Bonanza, 14 bushels per acre at 40 cts	$14 00
2½ " American Banner, 17 bushels per acre at 40 cts	17 00
8 " Early Calder, 17 bushels per acre at 40 cts	54 40
13 tons straw at $1.50	19 50
	$104 90
103 bags small potatoes at 30 cts	$30 90
Estimated value of crop of 1890	**$3,764 10**

Live Stock.

We have had a very successful year as regards our live stock department as is shown by the fact that the losses only amount to one grade cow valued at $40 and a grade calf and a number of lambs, the value of which it is not easy to estimate.

Two colts have been bred. One was sold at the public sale on 7th October, and the other is now five days old and promises to be a good one.

The live stock on hand at the present consists of seventy-eight head of cattle, one hundred and sixty-five sheep, forty-nine pigs and eleven horses for farm use and eight more for the use of other departments.

The silo has been recently opened and we find the ensilage in good condition and the stock seem fond of it.

I may here say that the one silo which we have is certainly inadequate for the amount of stock which is being kept. Another silo is necessary so that the experimental department could carry on their work independent of the farm proper.

We are now feeding the farm stock in the following manner. Hay and oat straw 2-1 being mixed at the cutting box on the barn floor and passed through the cutting box is carried by a short elevator to a shute where it drops into the feed room close to the root pulper which is driven by the same power. Here the cut feed and pulped roots are mixed.

The feed is prepared twice each week and we find that all the feed is eaten without waste.

For the average milch cow we find that a ration of 10 lb. hay, 5 lb. straw, 2 lb. of bran, and 2 lb. of meal with about 25 lb. of pulped roots per day and given in three feeds is a fair ration and some cows even require a less quantity.

We endeavor to give each animal only what will be eaten clean.

In preparing the food for horses, we place the cutting-box in the horse stable loft directly over the feed room so that the cut feed drops down. In the winter season when the work is not heavy, we mix oat straw with hay for horses and also feed carrots once each day.

The mangers of the horse stable are so arranged with a close box at one corner and a large space running across the stall with a slat bottom that we can feed long hay if necessary, but we find least waste of hay by feeding it cut and mixing the meal or bran and hay together.

On the 10th of November the herdsman, (John Harvey) resigned, to go to another stock farm. This change disarranged the work somewhat for a few days, when two young men of the 2nd year class, Messrs. Milne and McKenzie took charge of the stock, and I am pleased to say, that notwithstanding the importance of their college work at that season of the year, the stock was carefully attended to by them.

It is necessary that we should keep from nine to eleven milch cows during the college term to supply milk for the use of the college.

The following is a list of the number of gallons supplied each month. Jan. 191½, Feb. 332⅔, March 425, April 428, May 489½, June 412½, July 342½, Aug. 296¾, Sep. 148½, Oct. 412½, Nov. 432⅓, Dec. 346½.

During the year we have purchased a great deal of grade stock, for the purpose off feeding off the surplus crops of hay pasture, silage and soiling crops.

The following is a list of the stock which has been sold off the farm during the year:—

Fat Cows:

One fat cow	$67,00,	first cost $42.00,	purchased 1886
“ “ “	40.00,	bred on the farm.	
“ “ “	55.00,	first cost $68.00,	purchased 1888.
“ “ “	55.00,	“ “ 70.00,	“ “
“ “ “	52.00,	“ “ 36.00,	“ 1890.
“ “ “	52.00,	“ “ 50.00,	“ “
	$321.00	$266.00	

The following is a list of cows purchased in January for the purpose of supplying milk to the college and were resold as soon as their flow of milk ceased.

One cow	$25.00,	first cost	$20.00,	purchased in January 1890.
" "	42.00,	" "	40.00,	" " " "
" "	40.00,	" "	37.00,	" " " "
" "	38.00,	" "	36.00,	" " " "
" "	52.00,	" "	50.00,	" " " "
" "	45.00,	" "	42.00,	" " " "
" "	44.00,	" "	44.00,	" " " "
" "	50.00,	" "	47.00,	" " " "
	$336.00		$316.00	

Ten fat steers were sold in May, having been purchased in October of 1889.

They cost $500 or an average of $50 each, and were sold for $898 or an average of $89.80 each.

The following cattle were sold that were bred on the farm or purchased when young:

Shorthorns :

One heifer	$ 31 00
" "	170 00
One bull calf	53 00
	$254 00

Herefords :

One bull calf	$ 64 00
" heifer "	53 00
	$117 00

Aberdeen Angus :

One bull calf	$ 42 30
" " "	50 00
" " "	40 00
	$132 30

Galloways :

One heifer calf	$ 77 00
" "	69 30
	$146 30

Jerseys :

One heifer calf	$ 75 00

Devons :

One heifer calf	$55 00

Holsteins :

One cow	$ 80 00
" bull	51 85
" "	76 00
" "	70 00
" "	100 00
	$377 85

Ayrshires :

One bull	$ 55 00
" "	41 00
	$ 96 00

The following is a list of the Sheep sold this year :

Cotswolds :

One ram lamb	$ 6 00
" " "	6 00
	$12 00

Leicesters :

One ewe	$ 6 47
" " lamb	8 00
" ram	9 00
" "	31 00
	$54 47

Oxford Downs :

One ewe lamb	$ 25 00
" ram "	29 00
" ewe "	20 00
" " "	26 00
" " "	21 00
	$121 00

Shropshire Downs :

One ewe	$ 28 00
" "	31 00
" "	30 00
" ram lamb	14 00
" " "	15 00
" " "	20 00
	$138 00

Southdowns :

One ewe	$ 15 00
" ram lamb	10 00
	$25 00

Horned Dorset :

One ewe lamb	$ 14 00
" " "	14 00
" ram "	12 60
	$40 60

GRADE SHEEP SOLD THIS YEAR.

Lambs :

22 lambs	$163 30
25 "	207 00
1 "	6 00
7 "	21 00
364 "	2,018 23
27 old sheep	155 25
6 " "	31 00
Total	$2,601 78

SWINE.

Grade Pigs :

8 pigs	$ 81 38
7 "	77 52
3 "	45 00
6 "	94 75
2 "	25 00
7 "	63 65
1 "	10 00
1 "	15 00
8 "	79 00
1 "	2 00
36 "	$493 30

Pure bred Berkshires sold this year.

One pig	$18 00
" "	19 50
" "	7 50
" "	4 25
" "	4 00
" "	8 00
" "	5 75
" "	10 50
" "	13 50
" "	12 00
" "	15 00
" "	18 00
" "	15 00
" "	14 00
" "	13 00
" "	20 00
" "	14 00
" "	11 75
" "	15 00
" "	8 00
" "	9 00
" "	8 50
" "	8 25
" "	25 00
24 pigs	$297 50

Pure bred, improved Yorkshire pigs sold this year.

One pig	$ 38 00
" "	8 00
" "	10 00
" "	7 00
" "	6 00
" "	12 00
" "	16 00
" "	13 00
" "	17 00
" "	15 50
" "	16 50
" "	6 00
" "	14 00
" "	6 00
" "	7 50
" "	11 00
" "	10 25
" "	11 00
" "	10 00
" "	8 50
" "	13 25
" "	10 25
" "	6 00
" "	13 50
" "	13 00
25 pigs	$299 25

SUMMARY.

Sales of Live Stock made this year :

6 Fat cows	$ 321 00
8 Cows not milking	336 00
10 Store cattle	898 00
3 pure bred Shorthorns	254 00
2 " " Herefords	117 00
3 " " Aberdeen Angus	132 30
2 " " Galloways	146 30
1 " " Jersey	75 00
1 " " Devon	55 00
5 " " Holsteins	377 85
2 " " Ayrshires	96 00
	$2,808 45

Sheep :

452 Grade sheep and lambs	$2,601 78
2 pure bred Cotswolds	12 00
4 " " Leicesters	44 47
5 " " Oxford Downs	121 00
6 " " Shropshire Downs	138 00
2 " " Southdowns	25 00
3 " " Horned Dorset	40 60
	$2,992 85

Swine :

42 Grades	493 30
24 pure bred Berkshires	297 50
25 " " Improved Yorkshires	299 25
	$1,090 05
Total revenue from stock, including hides, service fees, etc.	$7,212 34

The following is a valuation of the live stock at present in the stables :

Horses :

One span work horses for farm use	$ 330 00
" " "	375 00
" " "	475 00
" " "	450 00
Single cart horse	70 00
One mare for general use	60 00
" foal 5 days old	25 00
" span horses for experiment and instruction	250 00
	$2,035 00.

CATTLE.

Herefords :

1 Bull, " Conqueror".	$100 00
1 Cow, " Jeranium "	300 00
1 " " Sibyl "	200 00
	$600 00

Galloways :

1 Cow, " Gem "	$75 00
1 Steer, " McCrea," 1 year old	31 57
	$106 57

Aberdeen Angus :

1 Bull, " Bognia of Kinnoul Park "	$250 00
1 Cow, " Kyma "	170 00
1 " " Blooming Rose "	300 00
	$720 00

Ayrshires :

1 Cow, " Nelly May 2nd "	$ 60 00
1 " " Tena "	75 00
1 " " Susie "	125 00
1 " Heifer calf	40 00
	$300 00

Devons :

1 Cow, " Beauty "	$100 00

Holsteins :

1 Bull, " America's Grandson "	$150 00
1 Cow, " Artis "	375 00
1 " " Alvo "	200 00
1 Bull calf	50 00
	$775 00

Shorthorns :

1 Bull, " Baron of Waterloo "	$600 00
1 Cow, " Maud 2nd "	150 00
1 " " Lady Joyful "	120 00
1 " " Authoress "	90 00
1 " " Laundress "	125 00
1 " " Matchless of Elmhurst "	350 00
1 Heifer, " Flower of Riverside "	125 00
1 " calf, " *dam Laundress* "	25 00
	$1,585 00

Jerseys :

1 Bull, " Pogis of Flamboro "	$100 00
1 Cow, " Lisgar's Rose "	300 00
1 " " Helen St. Helier "	100 00
1 " " Oakla Belle "	300 00
1 Heifer calf (dam Lisgar's Rose)	50 00
1 Bull calf (dam Oakla Belle)	50 00
	$900 00

GRADE CATTLE.

Cows :

10 Milch cows @ $43.00	$430 00

Steers :

16 Shorthorn grade steers, 2 and 3 years old, weighing *21,931* lb., @ 4 cents per lb	$877 24
1 Galloway grade steer, 2 years old (1,390 lb.) @ 4¾ cts. per lb.	66 00
(Under one year old.)	
1 Shorthorn grade steer, 1 " " (1,256 lb.) @ 4 " "	50 24
1 " " " 1 " " (1,212 lb.) @ 4½ " "	54 54
1 " " " 1 " " (1,245 lb.) @ 4½ " "	56 02
1 " " " 8 months (669 lb.) @ 4½ " "	30 10
1 " " " 9 " (741 lb.) @ 4½ " "	33 34
1 Aberdeen Angus grade steer weight (685 lb.) @ 5 " "	34 25
1 Shorthorn " " " (835 lb.) @ 5 " "	41 75
1 Galloway " " " (865 lb.) @ 5 " "	43 25
1 Devon " " " (733 lb.) @ 5 " "	36 65
1 Holstein " " " (757 lb.) @ 5 " "	37 85
1 Shorthorn " " " (600 lb.) @ 4 " "	24 00
1 Hereford " " " (841 lb.) @ 5 " "	42 05
1 Ayrshire, under 6 months, grade heifer	12 00
1 Angus " " " steer	6 00
1 Galloway " " " "	7 00
1 Scrub " " steer, weight (485 lb.) @ 2½ cts.	12 12
Total value of grades	$1,894 40

SHEEP.

Cotswolds :

1 Stock ram	$ 40 00
4 " ewes @ $15.00	60 00
2 Ewe lambs @ $3.00	6 00
1 Ram "	3 00
	$109 00

Leicesters :

5 Stock ewes @ $12.00	$ 60 00
2 Ram lambs @ $10.00	20 00
4 Ewe lambs @ $10.00	40 00
	$120 00

Oxford Downs :

4 Stock ewes @ $18.00	$ 72 00
2 Ewe lambs " $14.00	28 00
	$100 00

Shropshire Downs :

1 Stock ram (imp)	$120 00
5 Stock ewes @ $25.00	125 00
2 Ewe lambs " 15.00	30 00
	$275 00

South Downs :

1 Stock ram (imp)	$90 00
4 " ewes " @ $25.00.	100 00
1 Ram lamb	18 00
	$208 00

Horned Dorset :

1 Stock ram	$ 20 00
2 " ewes @ $20.00	40 00
	$60 00

Grades :

121 Lambs (weight 12,100 lbs.) @ 5cts	$605 00
Total value of sheep	$1,477 00

SWINE.

Berkshires :

1 Stock boar (imp)	$100 00
1 " sow	40 00
1 " "	25 00
1 " " (imp)	75 00
1 " "	50 00
1 Young boar	15 00
1 " sow	6 00
1 " "	6 00
1 " "	6 00
Total value	$323 00

Improved Yorkshires :

1 Stock boar (imp)	$75 00
1 " sow "	85 00
1 " " "	85 00
1 " " "	85 00
1 " " "	85 00
1 " " "	85 00
1 " " "	85 00
1 Young boar, imp. in dam	15 00
8 " pigs @ $8.00	64 00
Total value	$664 00

Grades :

1 Stock sow	$15 00
3 Small pigs @ $2 00	6 00
11 " " " 5.00	55 00
8 " " " 3.50	28 00
Total value	$104 00

VALUE OF STOCK ON FARM AT PRESENT.

Horses	$2,035 00
Cattle	6,980 97
Sheep	1,477 00
Swine	1,091 00
Total value	$11,583 97

The following is an inventory of tools and implements :—

Sleighs :

3 Set sleighs @ $20,00	$60 00
1 Long "	7 00

Waggons :

4 Waggons @ $20.00	80 00
1 Farm truck	50 00
3 Carts @ $8.00	24 00

Miscellaneous :

1 Binder	70 00
2 Mowers $40.00 and $25.00	65 00
1 Hay rake	7 00
2 " " @ $22.00	44 00
1 " tedder	4 00
1 St. George cultivator	17 00
2 Land rollers @ $14.00	28 00
5 Tolton jointer plows @ $12.00	60 00
1 Gale sp. tooth harrow	38 00
1 " "	4 00
1 Eagle sulky "	20 00
1 " spring tooth "	28 00
2 Gang plows (Norwich) @ $12.00	24 00
2 " " (Teeswater) " $15.00	30 00
1 Corban harrow	18 00
1 12-hoe graindrill (Noxen)	65 00
1 9 " " " "	27 00

Miscellaneous—Continued.

2 Sets iron harrows @ $7.50	15 00
2 “ “ “ “ $5.50	11 00
1 Root seed sower	28 00
2 Double mould plows @ $9.00	18 00
2 Sod plows @ $9.00	18 00
1 Sub-soil plow	10 00
4 Horse hoes @ $10.00	40 00

Implements:

2 Pea harvesters @ $12.00	24 00
1 Potato plow	2 50
1 Farm cutter	30 00
1 Rood scraper	7 00
1 Farm engine	450 00
1 Grain chopper	25 00
1 Thresher	260 00
1 Cutting box	35 00
2 Fanning mills @ $23.50	47 00
2 Root slicers “ $14.00	28 00
1 Farm buggy	60 00
1 Democrat waggon	80 00
1 Office stove	10 00
Small tools	85 30
Total	$2,053 80

Your obedient. servant,

JOHNSTON E. STORY,
Farm Foreman.

REPORT OF THE ASSISTANT SUPERINTENDENT OF EXPERIMENTS.

To Professor Thomas Shaw:

Sir,—I have the honor of herewith submitting the report of the agricultural experiments conducted at this institution during the year 1890. My report including the summary of the readings of the meteorological observations, lysimeters, soil thermometers, drainage waters, etc., and also the chemical analysis of forty-one samples of fodder corn and two samples of ensilage all of which was done in duplicate, during the end of the last and the beginning of the present year, has been handed to Prof. James for the report of the chemical department.

We have been favored with a large measure of success in both the field and live stock experiments, during the year just closing and I wish to express my earnest desire that the results of these practical experiments which have been very carefully conducted might in some way reach the home of every Ontario farmer.

The experiments in the field were even more extensive than last year there being upwards of six hundred plots, averaging from one-hundredth to one acre in size and containing grain, potato, root, forage and grass crops. These made upwards of fifty acres devoted specially to experimental purposes during the present year, and there were also several fields upon the farm devoted to experiments of a more general character.

The season has, on the whole, been favorable for our work, but owing to the excessive wet weather in the earlier part of the summer, I was compelled to drop a few of the root experiments which I had planned for this year.

A number of meteorological instruments placed in one of the experimental fields, and which were read three times daily, show a weather record of much value in connection with our experimental work upon the field plots.

The amount of rain which fell during the five months (May 1st to Sept. 30th) as compared with that for the same period of the three previous years, was as follows :—

	1887.	1888.	1889.	1890.
	inches.	inches.	inches.	inches.
May	1.58	1.08	3.59	2.18
June	2.36	2.92	4.25	5.31
July	.61	2.21	2.67	1.44
August	2.71	2.16	1.92	1.74
September	1.52	1.55	1.04	.72
Total	8.78	9.92	13.47	11.39

The average temperatures for each month of the same periods were as follows :—

	1887.	1888.	1889.	1890.
May	60.49	50.98	52.3	50.7
June	65.02	64.36	59.8	65.4
July	72.87	67.22	67.8	68.2
August	65.58	66.56	64.4	62.8
September	55.83	54.96	58.3	55.4
Average	63.96	60.78	60.5	60.5

There has been a regular system of live stock experiments conducted throughout the year, as a week has not elapsed during the past twelve months without having two or more experiments under way. At the present time there are fully as many tests being carried on as can possibly be handled to advantage, with the room at our disposal.

In all our experimental work it is very evident that there is a growing appreciation in the work accomplished, and the farmers of Ontario are finding out more and more that it is our highest aim to assist them in the real practice of their farm operations by bringing before them the honest results of experiments of a thoroughly practical nature. According as there is a high appreciation by the farmers of the work done ; as there is a true harmony existing between this institution and the farming community ; and as we, at this experiment station, are honest and faithful in the discharge of the many duties devolving upon us, the greatest good can be expected to follow.

I greatly admire the action you have taken in the greater development of the experimental work of this institution, and specially do I admire your stand in regard to having the experiments so repeated that from them conclusions of great practical value can be shown.

In my report, throughout, I have endeavored to give as concise and at the same time as clear a statement as possible of the various experiments with their results, and will leave the summaries as last year for you to embody in your report.

The following list shows the experiments which have been conducted this year and also the order in which they are considered in the report :—

I.—FIELD PLOT EXPERIMENTS.

1. *Cereals.*
   - (*a*) Cereals on small plots.
     1. Barleys, tests of varieties.
     2. Barleys, different dates of seeding.
     3. Peas, tests of varieties.
     4. Spring wheat, tests of varieties.
     5. Spring wheat, different dates of seeding.
     6. Fall wheat, tests of varieties.
     7. Oats, tests of varieties.
     8. Oats, different dates of seeding.
   - (*b*) Cereals on large plots.
     9. Barleys, tests of varities.
     10. Spring wheat, tests of varities.
     11. Oats, tests of varieties.
2. *Potatoes and Roots.*
   12. Potatoes, tests of varieties.
   13. Turnips, tests of varieties.
   14. Mangels, tests of varieties.
   15. Carrots, tests of varieties.
3. *Forage Crops.*
   - (*c*) Rape.
     16. Rape, grown upon four kinds of soil.
     17. Ridged against flat surface in rape cultivation.
     18. Fertilisers with rape.
     19. Thinning rape to different widths.
   - (*d*) Permanent pasture grasses.
     20. Grasses grown singly.
     21. Grasses grown in mixtures.
4. *Co-operative Experiments.*
   22. Fertilisers with oats.
   23. Corn cultivation.

II.—LIVE STOCK EXPERIMENTS.

24. Corn ensilage for making beef.
25. Fattening lambs.
26. Corn ensilage and roots as food factors in swine feeding.
27. Feeding swine on grain and meal.
28. Green fodder as a factor in swine feeding.
29. Soiling cows in summer.
30. Grade steers of different breeds.
31. Stable confinement in rearing cattle.
32. Berkshire *versus* Improved Yorkshire as pork producers.

I.—FIELD PLOT EXPERIMENTS.

The experimental plots during the past year have occupied parts of a number of fields over the farm, as some portions are better adapted for experiments of one kind and other portions for experiments of another kind. In cases where we have repeated experiments upon the same land for a number of years, great care has been taken to keep the soil in good condition and in some instances the plots have been run crosswise of those of the previous years and thus we have been avoiding the liability of using to the detriment of the experiment, soil which has become uneven by means of crops of varying growths.

1. CEREALS.

The tests of different varieties of cereals during the year just closing, has been more extensive than those of previous years as upwards of three hundred varieties have been grown, which number consisted of imported as well as Ontario grains. The imported varieties were mostly the first and second crop from seed obtained from different parts of Europe, Asia, Africa, Australia, New Zealand and the United States. Among those grains which have been imported, we find some exceedingly promising varieties after two years testing, for among the barleys, wheats and oats are varieties which, in point of yield, considerably surpass those which have been grown in Ontario during a number of years.

We aim to have all of our grains sown in two different places on the farm each year, and the most promising varieties are often sown upon three, four, or even five different plots. Our regular system is : (1) to have the varieties of the same grain always once and sometimes twice or even thrice upon plots of exactly the same size, from which yields per acre are calculated. (2) To have the varieties in single rows with 200 grains in each row. (3) To have some of the most promising varieties in larger plots varying in size from one-fourth to one acre.

(*a*) *Cereals on Small Plots.*

These tests were made to ascertain the relative value of different varieties of grain for Ontario farming and the advantages and disadvantages of different dates of sowing grain.

The plots varied from one-hundredth to one-fiftieth of an acre in size, and were measured off to the fraction of an inch. Stakes were driven at the four corners of each plot, and paths about thirty inches wide were left between each two plots. The grain for the various plots was weighed, bagged and labelled in the barn, and as soon as the land was ready, all the varieties of the same kind of grain were sown the same day, if at all possible. A line was stretched around each separate plot and the grain sown broadcast inside this line. A light narrow harrow was used to cover the grain, and the plots were all rolled when the ground was not sticky. After the grain came up a line was again run around each plot, and every plant which chanced to be outside of the line was cut off, thus making the plots not only very accurate for the experiment but also very neat in appearance. When the grain was ready for harvesting, one man did the whole of the cutting with a cradle, taking in order the different varieties as they were first matured.

In the experimental barn is situated a new separator, small in size and specially fitted for threshing grains of an experimental nature. This machine is driven by a tread power which runs charmingly, and is certainly well adapted for our requirements. In the mow, the floor of which is just beside and a little elevated from the feed table of the separator, was this summer placed a scale with a platform, six feet wide by twelve feet long, made specially for receiving the produce from the plots to be weighed. These scales are very sensitive, and will weigh accurately anything from one-half a pound to thirty-five hundred weight. The grain from the plots is drawn to the side of the barn and pitched upon the floor of the mow, then upon the scales to be weighed, and from the scales to the separator. The mow is quite roomy, and as the cracks in the floor have been puttied and painted, thorough sweeping can be accomplished after each plot has been removed. The four double doors at equal distances from each other along the back of the mow allow of a number of plots being stored away in the barn without danger of mixing.

With our present arrangements, we are enabled to have going on at the same time, the cutting, drawing, weighing, threshing and fanning of the grain as is often found absolutely necessary in properly caring for the crops and making the experiments of the greatest value. During the present year, the separator was running nearly every day from morning till night for about four weeks. At the same time, the grains were being havested and threshed, collections were being made from the single rows (to prevent injury to the plots) for presenting at the leading exhibitions over Ontario.

(1) BARLEYS—TEST OF VARIETIES.

In range I of the old experiment field formerly known as field 14 of the farm were sown sixty varieties of barley, nearly all of which formed the second trial of the samples imported two years ago, but a number of the Canadian kinds were also in the list. The yields of barley during the past year was 14.7 greater than that of the average of the varieties of 1889. The soil on which they were grown was a clay loam, which had a crop of barley in 1889 and was manured with farmyard manure last autumn at the rate of fifteen tons per acre. The plots were all exactly the same shape and size, and contained one-fiftieth of an acre each. Seeding took place on April 19th, with seed at the rate of two bushels per acre.

TABLE NO. I shows the characteristics of fifty-four varieties of barley.

Variety.	Where obtained by O.A.C.	When obtained by O. A. C.	Years grown at O. A. C.	Date of maturity.	Length of plant. In.	Two or six-rowed variety.	Number of grains per ounce.
Cape	New Zealand	1889	1	Aug. 1st.	39	6	611
Chevalier	"	1889	1	" 8th.	40	2	677
Cheyne	Germany	1888	2	" 6th.	33	2	670
Emperor	"	1888	2	" 6th.	34	2	720
Golden Drop	"	1888	2	" 5th.	36	2	646
Hallett's Pedigree	"	1888	2	" 6th.	37	2	630
Oderbrucher	"	1888	2	" 1st.	39	6	743
Phœnix	"	1888	2	" 4th.	41	2	626
Diamond	"	1888	2	" 5th.	43	2	690
Scholey's Chevalier	"	1888	2	" 7th.	37	2	697
Probsteier	"	1888	2	" 4th.	41	2	632
Invel	"	1888	2	" 7th.	39	2	657
Italian Rice	"	1888	2	" 2nd.	28	2	600
Bestehorn	"	1888	2	" 2nd.	40	2	696
Three-rowed	"	1888	2	" 7th.	31	6	736
Golden Melon	"	1888	2	" 7th.	38	2	715
Dutch	"	1888	2	" 5th.	39	2	717
Australian	"	1888	2	" 4th.	40	2	657
Improved Imperial	"	1888	2	" 6th.	42	6	1005
Kalina	Sweden	1888	2	" 4th.	40	2	615
Guymalaya	"	1888	2	" 1st.	39	6	945
Pfanen	"	1888	2	" 3rd.	38	2	549
Kinnakulla	"	1888	2	" 2nd.	37	2	610
Very Early Lapland	Russia	1888	2	July 23rd.	29	6	813
Mandschurei	"	1888	2	" 31st.	40	6	755
Annats	Scotland	1888	2	Aug. 7th.	34	2	703
Chevalier	"	1888	2	" 7th.	38	2	726
Perfection White	England	1888	2	" 9th.	37	2	722
Golden Drop	"	1888	2	" 7th.	41	2	827
Thanet	"	1888	2	" 8th.	42	2	780
Improved Golden Melon	"	1888	2	" 8th.	39	2	770
Early Minting	"	1888	2	" 6th.	......	2	708
Improved Cheyne	"	1888	2	" 5th.	42	2	747
Improved Beardless	"	1888	2	" 7th.	41	2	735
Selected Chevalier	"	1888	2	" 7th.	41	2	758
Empress	"	1888	2	" 6th.	39	2	790
Imperial	France	1888	2	" 4th.	40	2	717
Large Skinned	"	1888	2	" 6th.	38	2	478
Two-rowed Italian	"	1888	2	" 7th.	40	2	557
Chevalier	"	1888	2	" 4th.	35	2	667
Early Black	"	1888	2	July 31st.	32	6	591
Chevalier	"	1888	2	Aug. 6th.	40	2	657
Two-rowed spreading or fan	"	1888	2	" 4th.	31	2	573
Peerless White	Ontario (Dom. Exp. Farm)	1889	2	" 7th.	37	2	750
English Malting	" " "	1889	2	" 7th.	38	2	668
Beardless	" " "	1889	2	" 6th.	39	2	750
Carter's Prize Prolific	" " "	1889	2	" 6th.	39	2	683
Skinless	Australia	1886	4	July 21st.	34	6	997
Italian	Italy	1888	2	" —	41	2	649
Scotch Improved	Ontario	....	Several.	" 31st.	40	6	805
Black Hulless	"	....	"	" —	36	6	633
Mensury	"	....	"	" 31st.	46	6	786
Common Six-rowed	"	....	"	" 31st.	33	6	819
Hungarian	Hungary	1888	2	" 4th.	......	6	930

Table No. 11 shows the yields from fifty-four varieties of barley 1889 and 1890.

Variety.	Weight of grain per measured bushel.	Yield of		Yield of grain per acre, bushel per weight—48 lb.			Yield of straw per acre—tons.			Comparative order of grain yield for 1890.
		Grain per plot.	Straw per plot.	1889.	1890.	Average	1889.	1890.	Average	
	℔.	℔.	℔.							
Cape	51	47¼	54	......	51.3	....	......	1.35	....	4
Chevalier	54⅝	41½	66½	......	44.3	....	......	1.66	....	13
Cheyne	53½	47	65	47.9	49.0	48.5	2.73	1.62	2.18	8
Emperor	53	25¾	59¼	36.5	26.8	31.7	2.38	1.40	1.89	46
Golden Drop	53½	38¾	57¼	40.6	42.2	41.4	2.20	1.48	1.84	18
Hallett's Pedigree	53⅜	46¼	54¼	34.4	48.2	41.3	1.69	1.35	1.52	10
Oderbrücher	54¼	43⅝	62⅜	44.3	47.2	45.8	1 29	1.55	1.42	11
Phœnix	53	32½	61	46.9	33.9	40.4	1.98	1.52	1.75	36
Diamond	52¾	25½	37	......	26.6	....	......	.92	....	47
Scholey's Chevalier	53	31¼	45¼	34.4	32.6	33.5	1.74	1.13	1.44	38
Probsteier	52	32½	63½	37.5	33.9	35.7	1.80	1.55	1.68	36
Invel	51½	30	44	22.9	31.3	27.1	1.46	1.10	1.28	40
Italian Rice	50	32	54	45.8	35.1	40.5	1.73	1.35	1.54	34
Bestehorn	52	42	67½	29.1	43.8	36.5	1.64	1.68	1.66	14
Three-rowed	61 1-5	23½	38	26.0	24.5	25.3	1.45	.95	1.15	50
Golden Melon	52⅞	25¼	37¼	31.3	26.3	28.8	1.30	.93	1.12	48
Dutch	44	29¼	70¼	20.8	30.5	25.7	1.15	1.75	1.45	42
Australian	52½	33¾	49¼	......	35.2	....	......	1.23	....	33
Improved Imperial	47⅞	36¼	60¾	28.1	37.8	33	1.59	1.51	1.55	28
Kalina	52⅝	39¼	64¼	35.4	40.9	38.2	1.45	1.60	1.53	22
Guymalaya	61	36	58	34.4	37.5	36	1.58	1.45	1.52	29
Pfaner	52	28	41½	28.1	29·2	28.7	1.61	1.03	1.32	44
Kinnakulla	48⅓	25¼	44¾	24.5	26.3	25.4	1.66	1.11	1.36	48
Very Early Lapland	48	15¼	33¼	......	15.9	....	......	.83	....	53
Maudschurei	51¼	49¾	51¾	42.7	51.9	47.3	2.10	1.29	1.70	3
Annats	52	28½	43½	22.9	29.7	26.3	1.30	1.08	1.90	43
Chevalier	53⅜	27¼	42¾	24.0	28.4	26.2	1.20	1.06	1.13	45
Perfection White	52	34¾	53¾	18.8	36.2	27.5	1.11	1.34	1.23	30
Golden Drop	51¼	40¾	65¼	28.6	42.4	35·5	1.58	1.63	1.61	17
Thanet	50½	48½	66¾	26.0	50.5	38.3	1.36	1.66	1.51	6
Improved Golden Melon	51½	41¾	54¼	34.4	43.5	39	1.61	1.31	1.46	15
Early Minting	51¼	41½	61½	......	43.2	....	......	1.53	....	16
Improved Cheyne	52½	46½	72½	29.6	50.2	39 9	1.68	1.81	1.75	7
Improved Beardless	50½	37¼	61¾	27.6	38.6	33.1	......	1.54	....	26
Selected Chevalier	50½	50½	54½	33.3	52.6	43	2.14	1.36	1.75	2
Empress	51¼	45¼	76¼	43.7	47.1	45.4	1.94	1.90	1.92	12
Imperial	52¼	40¼	66¾	39.6	41.9	40.8	1.90	1.66	1.78	19
Large Skinned	63	21	39½	36.5	21.9	29.2	1.75	.87	1.31	31
Two-rowed Italian	52½	22½	75½	39.6	23.4	31.5	2.08	1.88	1.98	51
Chevalier	52⅓	51½	62	39.6	55.4	47.5	1.78	1.55	1.67	1
Early Black	51	47	78½	40.6	49.0	44.8	1.25	1.96	1.61	8
Chevalier	54½	39½	62½	......	41.2	....	......	1.56	....	21
Two-rowed Spreading.	49½	31¼	....	36.5	32.6	34.6	1.50	......	....	38
Peerless White	53	34¾	49¼	29.6	36.2	32.9	1.60	1.23	1.42	30
English Malting	52¾	34	49½	25.5	35.4	30.5	1.71	1.23	1.47	32
Beardless	52⅙	33	51	21.9	34.4	28.2	1.38	1.27	1.33	35
Carter's Prize Prolific.	52	34¾	54¾	26.6	38.0	32.3	1.59	1.36	1.48	26
Skinless	60½	8½	....	29.9	8.9	19.4	.68	......	....	54
Italian	51⅔	37¼	65¾	5.7	38.8	22.3	2.41	1.64	2.03	24
Scotch Improved	52	39¼	49¾	47.9	40.9	44.4	1.30	1.24	1.27	22
Black Hulless	63¾	30	50	....	31.3	....	......	1.25	....	40
Mensury	51⅓	37¼	49¾	....	38.8	....	......	1.24	....	24
Common Six-rowed	54½	40	55½	41.7	41.7	41.7	1.19	1.38	1.29	20
Hungarian	62¼	49	63	8.3	51.0	29·7	....	1.57	....	5

(2) BARLEY—DIFFERENT DATES OF SEEDING.

Barley was sown at three different dates, to ascertain some facts regarding the relative yields from different dates of seeding the present year. The plots were one-hundredth of an acre in size and were in duplicate in each case. Soil was a clay loam, manured in the winter of 1889. The barley sown was the Maudschuri which was put in at the rate of two bushels per acre. Pressure of work prevented seeding earlier than May 1st, but it is important to notice that the same variety seeded in the plots for testing varieties on April 18th gave a yield of 51.9 bush per acre. In an experiment in testing different dates of seeding barley in 1889, it was found that the yield from seeding on May 5th was 65.3 per cent. less than on April 15th, and that on June 7th it was 59.1 per cent. less than on May 5.

TABLE No. III shows the yields of barley from three dates of seeding.

Dates of seeding.	Separate plots.	Duplicate tests for each date of seeding.			Average of yields for each date of feeding.		
		Weight per measured bush.	Straw per acre, tons.	Grain per acre, standard bushels by weight.	Weight per measured bush.	Straw per acre, tons.	Grain per acre, standard bushels by weight.
May 1st	A	48¾	.91	31.8	49.88	1.02	37.3
	B	51.0	1.13	42.8			
May 9th	A	45½	.98	26.4	46.25	1.04	31.2
	B	47.0	1.11	35.9			
May 17th	A	42.0	.80	18.8	41.88	.77	18.0
	B	41¾	.74	17.2			

(3) PEAS—DIFFERENT VARIETIES.

There has been tested during the present year twenty varieties of peas, but owing to the very wet weather at the earlier part of the season the yields are somewhat smaller than usual. The yield per acre of our varieties of last year was 32.9 bushels and for 1890 the yield was only 21.6 bushels per acre. Seven varieties situated in another portion of the field and somewhat later than those reported upon were so injured by the wet that no reliable conclusions could be drawn and the peas were not harvested separately. The soil upon which the twenty varieties were grown was a clay loam, manured. last winter, at rate of fifteen loads per acre of farm yard manure. The seeding took place on April 24th, and the rate of seeding each variety is shown in the following table. The results are arranged in two parts in the tables. The first table gives the characteristics of the varieties and the second the figures regarding the sizes, weights, etc, of the peas of different kinds and the yields per acre :

TABLE No. IV shows the source and general characteristics of twenty varieties of peas.

Variety.	When and where obtained by O.A.C.		Years grown at O.A.C.	Quantity of seed sown p. a.	Date of		Average.		Width of pod.	Length of a row of ten peas touching each other.	Color of peas.	Outside character of peas.
	Country.	Year.			Seeding.	Maturing.	Length of vine.	Length of pod.				
				bus.			inches.	inches.	inches.	inches.		
Sweet Jessie...	England........	1888	2	2½	April 24..	Aug. 11..	42	2	½	3½	Light brown.	Slightly indented.
Early Britain...............	"	1888	2	2½	" 24..	" 11..	60	2¾	⅝	3	Brown.	Somewhat indented.
Perfection White...........	"	1888	2	3	" 24..	" 9..	36	2½	¾	3⅝	White.	Outline rather irregular.
Earliest of all Blue	"	1888	2	2	" 24..	July	30	2	½	2½	Blue.	Smooth.
Glory	"	1888	2	3	" 24..	Aug. 12..	33	2¾	3-5	3¾	Light blue.	Rough and irregular outline
Early Racehorse......	"	1888	2	2	" 24..	" 10..	52 5-6	2½	7-16	2½	White.	Smooth.
Hero of Reading	"	1888	2	3	" 24..	" 10..	42	2¾	⅝	3⅞	Blue.	Medium.
Selected Maple.............	"	1888	2	2	" 24..	July 27..	36	....	½	2⅝	Dappled brown.	Indented.
Veitches Perfection.........	"	1888	2	2	" 24..	Aug. 12..	25	3	⅝	3½	Light blue.	Crinkled very much.
Princess Royal	"	1888	2	3	" 24..	" 9..	36	3	¾	3½	White.	Nearly smooth.
Brown	New Zealand....	1889	1	3	" 24..	" 11..	36	2¼	⅝	3	Brown.	Slightly indented.
Blue	" ..	1889	1	3	" 24..	" 5..	48	2¾	⅝	3	Blue.	Slightly indented.
Field..........	" ..	1889	1	2	" 24..	" 7..	58	2¼	½	2¾	White.	Smooth.
White Wonder	" ..	1889	1	2½	" 24..	" 5..	26	2¼	½	3⅛	White.	Smooth.
Mummy....................	Ontario	1889	1	3	" 24..	" 11..	38	2	½	3	White.	Smooth.
Black-eyed Marrowfat	"	.....	Several.	3	" 24..	" 11..	61	2¾	⅝	3⅝	White (black eye.)	Smooth.
White-eyed Marrowfat	"	......	"	3	" 24..	" 11..	49	2½	½	3⅜	White.	Smooth.
Grass......................	"	......	"	2	" 24..	Sept. 10..	31	1½	½	2⅓	White.	Rough and angular.
Multipliers.................	"	......	"	2	" 24..	....	65	2 3-5	½	2⅞	White.	Smooth.
Prussian Blue	"	......	"	2½	" 24..	....	64	2½	½	2¾	Blue.	Smooth.

TABLE No. V shows the comparative results of twenty varieties of peas.

Variety.	Peas per pod.	Peas per ounce.	Grain per measured bushel.	Yield of straw per acre.	Yield of grain per acre (60 lb. per bush).	Comparative order of grain yield per acre, 1890.
	No.	No.	lb.	Tons.		
Sweet Jessie	4½	103	62¾	.82	31.16	1
Early Britain	3⅙	110	60	.57	28.37	4
Perfection White	3½	86	61	1.22	14.88	16
Earliest of all Blue	4 1-10	154	64	.42	10.46	18
Glory	4	82	62½	.98	26.04	7
Early Racehorse	5	144	64¼	1.06	29.29	2
Hero of Reading	4⅓	93	63	.89	26.27	6
Selected Maple	5¼	156	64½	.72	20.00	14
Veitches Perfection	4	81	58	.67	10.46	18
Princess Royal	4	80	63½	.57	13.02	17
Brown	4 1-7	105	60¼	.95	23.25	12
Blue	6	100	65½	1.11	18.14	15
Field	4 13-20	122	64½	.89	25.34	8
White Wonder	3	138	64¾	.80	27.67	5
Mummy	3	106	65¾	1.26	28.60	3
Black-eyed Marrowfat	4⅔	92	62	1.04	23.72	11
White-eyed Marrowfat	4	77	63¼	.93	21.16	13
Grass	3	212	66	1.51	5.12	20
Multipliers	4⅔	188	62½	1.44	25.34	8
Prussian Blue	4½	132	64	1.25	24.65	10

(4) SPRING WHEATS—TESTING OF VARIETIES.

There are three tables of spring wheats; the first being the results of eleven varieties which have been grown in Ontario for a number of years; the second being a report of the second crop from imported seed; and the third gives the results of the crop from imported seed two years old. Owing to 1889 being a very unfavorable season for spring wheats, and as some of the grains were late in getting here and therefore not ready for early seeding, we have taken the original seed of thirty varieties and given them a fair trial the present year. The following varieties were discarded at the end of 1889 as being totally unsuited for our climate: Crystal Rock, Sebastopol, Azima, Danubian, Dantzic White, Red Chaff White, Champion White, Selected Talavera White, Improved Red Nursery, Malága White, Grand Cianco, Square Head, Egyptian, Spelz (Switzerland), and Early Japan.

The spring wheats of the first two tables were sown on April 25, and those of the last table were sown on April 26, upon plots one-hundredth of an acre in size. Soil of those of the first two tables was a clay loam, and that occupied by those of the third table was clay loam with a large percentage of vegetable mould. The grain was sown at the rate of two bushels to the acre.

TABLE NO. VI shows the comparative results of eleven varieties of spring wheat, the seed of which was obtained in Ontario:

Variety.	Date of Maturity.	Length of plant.	Amount of rust. (1 to 10 being the standard adopted).	Weight of grain per measured bushel.	Yield of straw per acre.	Yield of grain per acre (bush. 60 lbs.).	Comparative order of grain yield per acre, 1890.
		Inch.			Tons.		
Red Fyfe	August 12	47	3	59½	1.95	15.83	5
Ladoga	" 5	42	2	56½	1.33	12.5	9
Wild Goose	" 12	52	1¾	62¾	2.27	12.9	8
Red Fern	" 11	48	¾	60	1.76	21.9	3
White Fyfe	" 14	50	3	60	1.39	26.9	1
White Russian	" 11	44	3	57¼	1.91	22.1	2
Colorado	" 6	52	3	61	1.07	15.8	6
Triumph	" 5	42	3	60	1.01	16.	4
Green Mountain	" 10	41	3	56½	1.32	12.5	9
Colorado	" 6	50	3	59¾	1.17	15.8	6
Lost Nation	" 14	38	4	56	1.00	8.8	11

TABLE NO. VII shows the comparative results of spring wheats, most of which are the second year's testing of imported varieties.

Variety.	Where seed was originally obtained.	at of maturity.	Length of plant.	Amount of rust. 1-10.	Weight of grain per measured bushel.	Yield of straw per acre. (Tons.			Yield of grain per acre. (Bushels by weight, 60 lb.)			Comparative yield of grain, 1889 and 1890.
						1889.	1890.	Average	1889.	1890.	Average	
Pringle's Champion	Germany	August 12	43	¼	59½	1.4	1.9	1.6	15	21.2	18.1	2
Holben's Improved	"	" 14	42	1½	58½	.5	1.7	1.1	11.7	20.4	16.1	4
Summer	"	' 9	38	1½	58¼	1.5	1.5	1.5	10.0	17.5	13.8	5
Saxonka	Russia	" 11	42		57¼	....	1.0	....	11.7	10.6	11.2	9
Odessa Ghirka	"	" 12	43	2	60	1.4	1.5	1.5	8.3	15.8	12.1	6
Konisburg	"	" 11	44	½	62⅜	1.4	1.5	1.5	10.9	12.2	11.6	8
Dantzic	"	" 13	42	1	58½	....	1.4	....	8.3	12.5	10.4	10
Ordinary March	France	" 8	39	3	51¼	1.2	.9	1.1	6.7	7.1	6.9	13
Red Bearded March	"	" 6	36	2	57	1.3	.9	1.1	10.0	10.8	10.4	10
Herison Bearded	"		44	¼	64	1.5	1.9	1.7	18.3	27.2	22.1	1
Bearded Red	"	6	41	......	58	.8	1.2	1.0	6.7	13.3	10.0	12
Ladoga	Ontario (Dominion Experimental Farm)	" 5	38	1	56½	....	1.0	....	8.3	15.8	12.1	6
Bart Trimenia	Greece	" 10	42	¼	64	1.0	1.6	1.3	6.7	26.3	16.5	3

TABLE No. VIII shows the comparative results cf thirty varieties of imported spring wheat.

Variety.	Where seed was obtained.	Date of maturity,	Bearded or bald.	Length of plant.	Length of head.	Amount of rust.	Weight of grain per measured bushel.	Yield of straw per acre.	Yield of grain per acre, bushels by weight (60 lbs.)	Comparative order of grain yield, 1890.
				in.	in.	1-10	lb.	Tons.		
Chidham White	Germany	Aug. 12	Bald	40	2¾	2½	52.3	1.17	10	15
King Bartigen	“	“ 11	Bearded	57	2½	1½	56	.91	9.6	16
Fern or April	“	“ 14	Bald	38	2½	4	......	1.08	2.9	30
Nenhert	“	“ 12	“	43	3	3	49.5	1.25	6.7	21
Triticum Spelta	“	“ 9	Bearded	46	3½	4	35	.73	18.8	1
Poland	Russia	“ 11	“	44	4¼	2	51	1.25	8.9	20
April Bearded Red	England	“ 11	“	47	3½	2½	50.8	1.72	9.2	18
Lonzelle White	France	“ 14	Bald	38	2¾	2½	47	1.45	5.0	25
Large Flag	“	“ 9	“	29	2½	5	51.2	.66	6.3	23
French Summer	“	“ 9	“	34	2½	3	52.8	1.09	10.2	13
Hickling's March White	“	“ 11	“	41	2¼	2	43.9	1.16	3.8	28
Ordinary Bearded March	“	“ 10	Bearded	40	2½	1½	57.5	1.52	17.5	2
March de Brie	“	“ 11	Bald	41	3	3½	53	1.66	11.3	12
Rousselin	“	“ 12	“	40	2½	½	......	1.01	2.1	31
Paros	Greece	“ 11	Bearded	43	2½	1	57.5	1.26	13.8	6
Voto	“	“ 11	“	45	2½	1	58.0	1.36	12.9	8
Grecian	Russia	“ 10	“	42	2¼	¾	59.9	1.28	13.8	6
Missogen	Greece	“ 11	“	40	2½	½	58.9	1.27	14.2	5
Atalank	“	“ 11	“	44	2½	1	57.5	1.23	12.1	10
Sorentino	Italy	“ 10	....	47	2	1	60	1.12	15.0	3
Neapel	“	“ 11	Bearded	38	2	5	51.5	1.28	9.6	16
Square Head	Sicily	“ 9	Bald	34	1½	7	49.5	.95	5.0	25
Red Wheat	“	“ 12	“	34	1½	7	...	.87	6.7	21
Mountain	Hungary	“ 12	“	27	2¼	2	58.8	.67	9.2	18
Banter	“	“ 14	Bearded	33	2¾	2	55	.88	4.6	27
Medeah	Africa	“ 9	“	47	2¼	2¼	62.5	.62	15.0	3
Algiers	“	“ 10	“	43	2½	1	58.3	1.16	12.1	10
African	“	“ 10	Bald	37	2¼	9	.....	.65	3.3	29
March White	California	“ 5	“	41	2	2	56	.89	10.2	13
Egyptian	Egypt	“ 18	Bearded	47	2¾	5	15	1.50	5.8	24

(5) SPRING WHEAT DIFFERENT DATES OF SEEDING.

The spring wheat used for this test was the Red Fyfe. The seedings took place just eight days apart, upon plots one-hundredth of an acre in size. The plots for each seeding were in duplicate as may be seen by the table. The soil consisted of a clay loam with a slight bearing to vegetable mould. Grain was sown broadcast at the rate of two bushels per acre. Unfortunate for the experiment, No. B. plot of May 17th, seeding is not reported upon owing to some mistake in handling the produce. The same variety of wheat seeded in another place on April 25th, upon soil very similar to that upon which the test was conducted gave a yield at the rate of 15.83 bushels per acre, being nearly one-half as much again as that seeded on May 1st.

TABLE No. IX shows the yield of spring wheat from three dates of seeding.

Dates of Seeding.	Separate Plots.	Duplicate tests for each date of seeding.			Average of yields for each date of seeding.		
		Weight per measured.	Straw per acre.	Grain per acre bus. by weight (60 lbs.)	Weight per measured.	Straw per acre.	Grain per acre bus. by weight. (60 lbs.)
		bus.	tons.		bus.	tons.	
May 1st	A	57.5	1.4	11.7	57.4	1.35	10.65
	B	57.3	1.3	9.6			
May 9th	A	57.	1.0	7.1	56.5	1.15	6.25
	B	56.	1.3	5.4			
May 17th	A	56.	1.4	5.4	*56.0	1.4	5.4
	B	....	....	....			

* Only one plot with spring wheat seeded on May 17th. B. unfortunately destroyed.

(6) FALL WHEATS—TEST OF VARIETIES.

There were eighteen varieties of fall wheats tested of which the seed was obtained in Ontario, and thirty-one varieties of which the seed was imported from foreign countries. Twelve of the imported varieties proved to be total failures, while some others are quite promising. The winter was very severe upon fall wheats, and especially upon those which were grown in this climate for the first time. The plots were situated in field No. 17 of the farm upon the side hill sloping to the south-west. Each plot was one-hundredth of an acre in size, consisting of clay loam and was manured in the fall of 1889. The seeding was done upon September 10th, except six varieties of the Canadian sorts which were not sown until later, owing to delay on part of seedsmen. Grain was sown at the rate of two bushels per acre.

TABLE No. X shows the results of the tests with eighteen varieties of fall wheats from Ontario seed.

Variety.	Date of seeding.	Date of maturing.	Strength of straw.	Amount of rust.	Bearded or bald.	Color of grain.	Weight of grain per measured bushel.	Yield of straw per acre.	Yield of grain per acre, bushels by weight (60 lbs.)	Comparative order of grain yields, 1890.
				1-10			lb.	tons		
Golden Drop	Sept. 10	July 25..	Medium..	2	Bald ...	Golden ...	61.2	2.34	32.5	5
Surprise	" 10	" 19...	Strong ...	1½	" ..	White....	58.7	2.83	29.6	12
Manchester	" 10	" 23...	Medium..	5	" ...	Amber ...	61.0	2.41	30.4	11
Bonnell or Landreth	" 10	" 25...	Strong ...	1	" ...	White....	61.0	2.51	32.1	7
Seneca or Clawson	" 10	" 25...	" ...	1	" ...	"	59.0	1.74	25.4	15
Rogers	" 10	" 27...	" ...	2	" ...	Amber ...	60.8	2.74	31.6	3
Hybrid Mediterranean	" 10	" 21...	Weak ...	3¼	Bearded	" ...	60.2	2.35	32.1	7
Martin Amber	" 10	" 27...	Strong ...	2	Bald ...	" ...	62.5	2.03	32.5	5
Standard	" 10	" 24...	" ...	3	" ...	White ...	59.3	2.13	31.7	10
Red Velvet Chaff	" 10	" 23...	" ...	2	" ...	Red......	61.0	2.48	35.8	2
Lancaster	" 10	" 20...	Weak ...	2	Bearded	"	61.8	3.33	33.3	4
Early Red Clawson	" 10	" 22...	Strong ...	2	Bald ...	"	58.0	2.51	32.1	7
Volunteer	" 12	" 19...	Medium..	3	Bearded	"	58.5	3.18	36.3	1
Golden Cross	" 19	" 20...	Strong ...	3	"	"	58.0	2.56	27.9	14
New Monarch	" 19	" 27...	" ...	3	Bald ...	"	56.7	1.88	20.0	16
Red Lion	" 19	" 23...	" ...	2	Bearded	"	60.0	2.20	29.2	13
Democrat	" 27	" 28...	" ..	4	"	Amber ...	56.5	2.18	20.0	16
Garfield or Natural Cross	Oct. 7	" 28...	" ...	2	Bald ...	White....	57.0	1.65	15.8	18

TABLE No. XI shows the leading characteristics of nineteen varieties of fall wheat, the seed of which was imported.

Variety.	Country from which seed was obtained	Power of withstanding the severe winter.	Date of maturity.	Length of straw.	Strength of straw.	Amount of rust.	Length of head.	Color of chaff.	Bearded or bald.
				in.		1-10	in.		
Galizien Summer	Germany.	Good—medium.	July 25.		Strong.	1		White.	Bald
Dividend	“	“	“ 30.	56	“	5	3½	Red	“
White Square Head	“	Medium	“ 30.	51	“	4	2¼	White.	“
One Grain Speltz	“	Good	Aug. 5	37	“	0	2	“	Bearded
Russian Odessa	Russia	Medium	July 30.		Weak	4			Bald
Herefordshire	England.	“	Aug. 1	50	Strong.	4	3¼	Red	“
Spalding Red	“	Poor	“ 2	43	“	2	2¼	“	“
Kessingland Red	“	“	“ 4	41	“	4	3½	White.	“
Golden Drop Red	“	“	“ 2	41	“	2	3	Red	“
Square Head	“	“	“ 4	39	“	3	2¼	White.	“
Lammas	“	“	“ 2	50	“	4	3½	Red	“
Champion Prize White	“	“	“ 1	38	“	4	3	White.	“
Browick Red	“	“	“ 3	48	“	4	3½	Red	“
Lamed Hybrid	France	Good—medium.	July 30.	50	“	4	3	“	“
Dattell's Hybrid	“	Medium	“ 31.	42	“	3½	2¾	“	“
Saumur	“	“	“ 31.	49	“	5	3½	White.	“
White Petanelle	“	Medium—poor.	Aug. 1	54	“	3	3½	“	Bearded
Rietti	“	Poor	July 30.	48	Medium	½	4½	Medium	“
Red Inversible	“	“	Aug. 1	47	“	4	2½	Red	Bald

TABLE No. XII shows the results of yields, etc., of nineteen varieties of fall wheat from imported seed.

Variety.	Color of grain.	Quality of grain.	Weight of grain per measured bus.	Yield of straw per acre.	Yield of grain per acre bus. by weight. (60 lb.)	Comparative order of grain yield.
			lb.	tons.		
Galezien Summer	Red	Excellent	62⅔	2.05	32.50	1
Dividend	“	Shrunken	53	2.57	23.33	5
White Square Head	White-red	“	57½	2.22	32.08	2
One Grain Speltz		Enclosed in chaff.	40½	1.92	47.33	Enclosed in chaff.
Russian Odessa			60⅔	2.05	28.33	3
Herefordshire	White	Medium	57½	1.75	23.33	5
Spalding Red	Red	Good	58½	1.33	17.08	12
Kissingland Red	“	Poor	52⅔	.60	5.00	18
Golden Drop Red	“	Medium	59¼	1.37	21.25	7
Square Head	“	“	56	1.15	15.83	13
Lammus	“	“	58½	1.75	20.00	8
Champion Prize White			57	.51	12.08	16
Browick Red	Red	Shrunken	55½	1.35	10.83	17
Lamed Hybrid	“	Medium	59	1.79	26.25	4
Dattell's Hybrid	White	Excellent	60	1.37	20.00	8
Saumur	Red	Shrunken	57½	1.37	14.16	14
White Petanelle	White	Medium	58	1.48	17.91	11
Rietti	Red	Good	59½	1.27	19.13	10
Red Inversible	“	“	59¼	1.31	13.75	15

(7) OATS, TESTING OF VARIETIES.

There were ninety-three varieties of oats tested upon the experimental plots during the year 1890. The results are in two tables; the first giving the characteristics of the growth and behavior of the various kinds; and the second table giving the yields for 1889 as well as for 1890.

The plots were one-hundredth of an acre in size, and situated in the first and second ranges of field number three on the farm. The soil was clay loam and was manured with farmyard manure at the rate of fifteen loads per acre during last winter. Seeding took place on April 22nd, and each plot was sown at the rate of two and a quarter bushels per acre.

TABLE No. XIII shows the characteristics of ninety-three varietie f Oats.

Variety.	Where obtained by O.A.C.	When obtained by O. A. C.	Years grown at O.A.C.	Date of maturity.	Length of plant, inches.	Character of head.	Amount of rust, 0 least, 10 most.	Colour of grain.	Number of kernels in one gram.	Percentage of hull in grain, 1890 crop	Percentage of kernel in grain, 1890 crop.
American Welcome	Germany	1888	2	July 4th.	....	Spreading..	....	White......	37	31.2	68.8
California White	do	1888	2	" 11	55	Mane......	2	"	50	33.0	67.0
Oderbrucher	do	1888	2	" 6	47	Spreading..	1	"	41	33.5	66.5
Thürigen	do	1888	2	" 11	51	"	4	Yellow.....	49	40.0	60.0
Danebrog	do	1888	2	" 9	48	"	2	White......	41½	30.0	70.0
Hopetown	do	1888	2	" 10	54	"	2	"	54	32.0	68.0
Yellow August	do	1888	2	" 12	51	"	3	Yellow.....	56½	30.0	70.0
Longfellow	do	1888	2	" 9	62	"	2	White......	39½	33.5	67.0
Probsteier	do	1888	2	" 6	50	"	2	"	44	30.8	69.2
Waterloo	do	1888	2	" 7	45	"	3	"	43	33.3	66.7
White Canadian	do	1888	2	" 10	46	"	3	"	40	29.8	70.2
Improved Besthorn	do	1888	2	" 9	41	"	3	Yellow.....	45	30.6	69.4
Nubian Black	do	1888	2	" 10	40	Mane......	2	Black......	40	33.9	66.1
August White	dc	1888	2	" 9	48	Spreading..	1½	White......	44	29.8	70.2
Georgien	do	1888	2	" 9	42	"	1	"	50	28.0	72.0
Providence	Sweden	1888	2	" 9	38	"	1	"	57½	31.8	68.2
Rosedale	Ontario	1890	1	" 8	45	Mane......	2	"	42	34.5	65.5
Scotch Potato	Russia	1888	2	" 10	34	Spreading..	2	"	59	35.2	64.8
White Poland	do	1888	2	" 7	46	"	½	"	51	31.4	68.6
Podolischer	do	1888	2	" 4	56	"	2	"	43	38.0	62.0
Egyptian	Ontario	....	Several.	" 7	56	"	2	"	45	26.1	63.9
Pringle's Progress	do	1889	1	" 4	48	"	1	"	39	35.0	65.0
Siberian	Russia	1888	2	" 9	54	"	1	"	44	28.3	71.7
White Tartarian	do	1888	2	" 11	54	Mane.....	2	"	44	34 8	65.2
Berwick White	Scotland	1888	2	" 8	46	Spreading..	2	"	55	32.0	68.0
Victoria White	do	1888	2	" 4	57	"	1½	"	43	33.6	66.4
Dun	do	1888	2	" 10	46	"	1	Dun.......	55	32.0	68.0
Black Tartarian	do	1888	2	" 11	42	Mane......	4	Black......	40	34.1	65.9
Hamilton	do	1888	2	" 10	44	Spreading..	2	White......	60	34.9	65.1
Bertrum Prolific	do	1888	2	" 10	40	"	2½	"	60	34.1	65.9
White Tartarian	do	1888	2	" 15	44	Mane......	3½	"	58	34.1	65.9
Black Poland	do	1888	2	" 11	44	"	3½	Black......	41	35.1	64.9
Birlie	do	1888	2	" 9	42	Spreading..	2	White......	58	30.7	69.3
Angus	do	1888	2	" 10	46	"	2	"	60	32.6	67.4
Longfellow	do	1888	2	" 7	42	"	2½	"	56	33.5	66.5
Hopetown	do	1888	2	" 11	52	"	3½	"	60	32.5	67.5
Potato	do	1388	2	" 10	34	"	2	"	62	38.1	61.9
Flying Scotchman	England	1888	2	" 3	59	"	1	"	43	36.5	63.5
Selected Winter	do	1888	2	" 12	51	"	2	Dun.......	50	36.3	63.7
Improved White Tartarian	do	1888	2	" 14	54	Mane......	3	White......	60	33.7	66.3
Dutch Bren	do	1888	2	" 3	51	Spreading..	1	"	48	39.4	60.6

White Tartarian	New Zealand.	1889	1	“ 8	52	Spreading..	3	“	47	34.1	65.9
Improved Black Tartarian	England	1888	2	“ 10	52	Mane	3½	Black	49	36.3	63.7
Early Racehorse	do	1888	2	“ 3	56	Spreading..	2½	White	47	38.8	61.2
Victoria Prize White	do	1888	2	“ 5	54	“	1½	“	45	38.8	64.5
Improved Waterloo White	do	1888	2	“ 9	48	“	3	“	51	37.8	62.2
Early Blossom	do	1888	2	“ 5	54	“	5	“	48	38.4	61.6
Yellow Flanders	France	1888	2	“ 11	57	“	5	Yellow	55	31.3	68.8
Brie Black	do	1888	2	“ 14	47	“	3	Black	63	36.9	63.1
Egyptian	Ontario	....	Several.	“ 9	55	“	2	White	48	33.3	64.7
White Abundance	France	1888	2	“ 7	52	“	2½	“	46	28.7	71.3
Black Red Crown	do	1888	2	“ 11	43	“	2½	Black (pale)	57	30.9	69.2
Georgia White	do	1888	2	“ 7	40	“	2½	White	48	35.1	64.9
White Hungarian	do	1888	2	“ 14	53	Mane	2½	“	60	32.1	67.5
Poland White	do	1888	2	“ 7	54	Spreading..	1	“	41	28.7	71.3
Yellow Gigantic	do	1888	2	“ 15	48	....	3	Yellow	58	36.6	63.4
Colommiers	do	1888	2	“ 14	50	Spreading..	2½	Black	61	36.8	63.2
Red spot	do	1888	2	“ 5	38	“	....	Dun	139	36.8	63.3
Joanette Black	do	1888	2	“ 9	38	“	1	Black (pale)	51	27.0	73.0
Round or Branching Black	do	1888	2	“ 10	46	“	2	“	61	38.1	61.9
Potato	New Zealand.	1889	1	“ 3	61	“	....	White	50	39.3	60.7
Chenailles Black	France	1888	2	“ 8	45	“	1	Black	55	26.0	74.0
Black Hungarian	do	1888	2	“ 13	49	Mane	2	“	43	34.5	65.5
Dunn	New Zealand.	1889	1	“ 15	52	Spreading..	1½	Dun	60	37.8	62.2
Black Etampes	France.	1888	2	“ 9	38	“	1	Black	41	26.8	73.2
Houdan Black	do	1888	2	“ 9	44	“	2	“ (pale)	66	28.9	71.2
Siberian	do	1888	2	“ 2	50	“	1½	White	51	30.0	70.0
Triumph	Australia	1886	4	“ 15	48	“	3½	“	62	51.0	49.0
White	do	1886	4	“ 2	50	“	1½	“	44	40.7	59.3
Carter's Prize Cluster	Ontario	....	Several.	“ 3	53	“	2	“	43	37.3	62.7
Flanders White	France	1888	2	“ 10	52	“	3½	“	47	36.3	67.4
Hopetown	Ontario	....	Several.	“ 9	44	“	3	“	42	33.6	66.4
Egyptian	do	....	“	“ 7	54	Mane	2	“	46	37.6	62.4
Racehorse	do	....	“	“ 3	50	Spreading..	2	“	45	37.6	62.4
Black Tartarian	do	....	“	“ 9	43	Mane	3½	“	50	36.1	63.9
Banner	do	1890	1	“ 8	53	Spreading..	2	“	48	35.2	64.8
Bavarian	do	1889	2	“ 8	51	“	3	“	51	37.2	62.8
White Australian	do	....	Several.	“ 14	49	Mane	3	“	48	31.8	68.2
Rennie's Prize White	do	....	“	“ 2	52	Spreading..	2	“	47	39.9	60.1
Acclimatized Black Tartarian	do	....	“	“ 11	52	Mane	3	Black	44	39.8	60.2
Pedigreed Black Tartarian	do	1888	2	“ 10	53	“	3	“	47	38.1	61.9
Black Champion	do	....	Several.	“ 11	55	“	2½	“	52	36.5	63.5
Improved Scotch	do	....	“	“ 9	52	Spreading..	2	White	51	37.9	62.1
Cluster or Triumph	do	....	“	“ 4	54	“	2½	“	51	41.5	58.5
Welcome	do	....	“	“ 4	56	“	2	“	49	41.4	58.6
Early Calder	do	....	“	“ 7	49	“	2	“	57	37.7	62.3
Hungarian Black	Hungary	1888	2	“ 9	40	Mane	2	Black	49	40.9	59.1
Port Adelaide	Australia	1888	2	“ 6	54	Spreading..	2	White	43	39.9	60.1
Australian White	do	1888	2	“ 6	47	“	2½	“	47	31.5	68.5
Prolific Black	California	1888	2	“ 7	51	Mane	3	Black	54	39.0	61.0
Danish	New Zealand.	1888	2	“ 7	39	Spreading..	3	White	46	37.9	62.1
White Wonder	Ontario	1889	1	“ 1	50	“	2	“	40	37.9	63.1

TABLE No. XIV shows the yield for ninety-three varieties of Oats for 1889 and 1890.

Variety.	Weight of grain per measured bushel.	Yield of—		Yield of grain per acre. Bushels by weight (34 lb.)			Yield of straw per acre. Tons.			Comparative order of grain yield, 2 years.
		Grain per plot.	Straw per plot.	1889.	1890.	Average.	1889.	1890.	Average.	
		lb.	lb.							
American Welcome	40⅛	15½	49½	50.	45.6	47.8	2.2	2.5	2.4	38
California White Prolific	32	15	47	47.1	44.1	45.6	3.1	2.4	2.8	45
Oderbrucher	31½	19¾	39¼	75.0	58.1	66.6	2.6	2.0	2.3	4
Thuringen	31½	13½	55	32.1	39.7	35.9	3.9	2.8	3.4	65
Danebrog	32	18	42	75.0	52.9	64.0	3.2	2.1	2.7	5
Hopetown	33⅛	12¾	60¼	23.5	37.5	30.5	....	3.0	3.0	78
Yellow August	29⅞	14	57	45.6	41.2	43.4	3.9	2.9	3.4	49
Longfellow	31⅝	9	56	25.	26.5	25.8	4.0	2.8	3.4	84
Probsteier	33	18½	44½	69.1	54.4	61.8	2.9	2.2	2.6	8
Waterloo	31⅓	19¼	44¾	64.7	56.6	60.7	3.1	2.2	2.7	11
White Canadian	33¾	19½	54½	63.2	57.3	60.6	3.1	2.7	2.9	13
Improved Besthorne	32¼	18	40	70.6	52.9	61.8	1.7	2.0	1.9	8
Nubian Black	32	17½	44½	48.5	51.5	50	3.3	2.2	2.8	32
August White	40½	14¾	45¼	41.2	43.4	42.3	3.8	2.3	3.1	51
Georgian	33⅝	19¾	43¼	63.2	58.1	60.7	3.6	2.2	2.9	11
Providence	35½	13¼	40¾	36.8	39.0	38.0	3.3	2.0	2.7	61
Rosedale	38½	18½	45½	26.5	54.4	40.5	3.9	2.3	3.1	56
Scotch potato	34¼	8¾	27¼	26.5	25.7	26.1	3.2	1.4	2.3	83
White Poland	34½	13¼	35¾	44.1	39.0	41.6	3.4	1.8	2.6	54
Podolischer	39¼	16¾	49½	32.4	49.3	40.9	2.9	2.5	2.7	55
Egyptian	37½	20	46½	57.4	58.8	58.1	3.7	2.3	3.0	16
Pringle's Progress	28½	21½	48	60.3	63.2	61.8	3.0	2.4	2.7	8
Siberian	40	15¼	36¾	73.5	44.9	59.2	3.3	1.8	2.6	15
White Tartarian	35⅜	18½	43½	60.3	54.4	57.4	3.8	2.2	3.0	19
Berwick White	36	12	39	44.1	35.3	39.7	3.5	2.0	2.8	58
Victoria White	42½	17¼	42¾	55.9	50.7	53.3	2.8	2.1	2.5	25
Dunn	32	13	56	32.4	38.2	35.3	4.4	2.8	3.6	67
Black Tartarian	34½	18	42	52.9	52.9	52.9	3.9	2.1	3.0	26
Hamilton	36	12¼	44¾	30.9	36.0	33.5	3.6	2.2	2.9	71
Bertrum Prolific	35⅛	13¼	45¾	39.8	39.0	39.5	3.6	2.3	2.5	59
White Tartarian	30⅛	15¼	56¾	42.6	44.9	48.8	4.5	2.8	3.7	33
Black Poland	35¼	17¼	44¾	54.4	50.7	52.4	2.8	2.4	2.5	28
Birlie	38	14¼	48¾	25.0	41.9	33.5	2.6	2.4	2.5	71
Angus	35½	15¼	54¾	22.1	44.9	33.5	2.3	2.7	2.5	71
Longfellow	35	14¼	49¾	29.4	41.9	35.5	3.5	2.5	3.0	66
Hopetown	33½	12½	65½	22.5	36.8	29.7	3.5	3.3	3.4	81
Potato	31½	10¼	41¾	20.6	30.2	25.4	2.8	2.1	2.9	86
Flying Scotchman	39	18	47	63.2	52.9	58	2.4	2.4	2.4	18
Selected Winter	32¼	10¼	45¼	22.1	30.2	26.2	2.3	2.3	2.3	32
Improved White Tartarian	29½	12½	62	23.5	36.8	30.2	3.1	3.1	3.1	79
Dutch Bren	36½	16	45	47.1	47.1	47.1	2.2	2.3	2.3	41
White Tartarian	29½	13¾	46¼	32.4	40.4	36.4	....	2.3	....	64

Improved Black Tartarian	30	13	44⅛	35.3	38.2	36.8	2.2	2.2	2.2	63
Early Racehorse	40½	12¾	39¼	32.4	37.5	35.0	1.6	2.0	1.8	68
Victoria Prize White	41	15	37½	47.1	44.1	45.6	1.8	1.9	1.8	45
Improved Waterloo White	29½	15¼	44¾	51.5	44.9	48.2	2.0	2.2	2.1	35
Early Blossom	36½	15¼	57¾	60.3	44.9	52.6	2.0	2.9	2.5	26
Yellow Flanders	29⅞	10½	55	33.8	30.9	32.3	3.2	2.8	3.0	75
Brie Black	29½	13¼	64¼	36.8	39.	37.9	3.4	3.2	3.3	62
Egyptian	38¼	19¼	46¾	55.9	56.6	56.3	2.7	2.3	2.5	19
White Abundance	35	19	55	61.8	55.9	58.8	2.4	2.8	2.6	17
Black Red Crown	31½	14½	68½	41.2	42.7	41.9	3.0	3.4	3.2	52
Georgia White	34½	17¼	76¾	61.8	50.7	56.3	2.6	3.8	3.2	19
White Hungarian	32½	13	60	47.1	38.2	42.7	2.7	3.0	2.8	50
Poland White	42½	15¼	42¾	64.7	44.9	54.8	1.9	2.1	2.0	22
Yellow Gigantic	27½	16½	60½	54.4	48.5	51.5	2.7	3.0	2.9	31
Coalommiers	29⅛	13¼	68¼	38.2	39.0	38.6	3.4	3.4	3.4	60
Red Spot	27½	9	48	35.3	26.5	30.9	2.5	2.4	2.5	77
Joanette Black	34½	21¼	60¾	80.9	62.5	71.7	2.4	3.0	2.7	1
Round or Branching Black	28½	10⅞	51⅝	25.3	32.0	33.7	2.7	2.6	2.6	70
Potato	38	14 1-5	47 3-10	54.4	41.8	48.1	2.7	2.4	2.5	37
Chenailles Black	34⅝	18	57	80.9	52.9	66.9	......	2.9	....	3
Black Hungarian	33½	16	59	45.6	47.1	46 3	2.7	3.0	2.8	43
Dun	30½	11	52	63.2	32.4	47.8	2.4	2.6	2.5	38
Black Etampes	36½	21¼	46¾	66.2	68.4	62.3	2.6	2.3	2.5	7
Houdan Black	34¾	26	54	61.8	76.5	69.1	1.3	2.7	2.0	2
Siberian	34¾	20¾	42¼	66.2	61.0	63.6	2.1	2.1	2.1	6
Triumph	27	9	45	20.6	26.5	23.5	2.3	2.3	2.3	88
White	40½	12	43	52.9	35.3	44.1	2.3	2.2	2.2	47
Carter's Prize Cluster	40⅓	13	35	50.0	38.2	44.1	2.2	1.8	2.0	47
Flander's White	34½	13½	38	25.0	39.7	32.4	2.8	1.9	2.3	74
Hopetown	33¼	14	41½	42.6	41.2	41.9	3.3	2.1	2.7	52
Egyptian	36¾	21¼	72¾	57.4	62.5	60.0	3.0	3.6	3.3	14
Racehorse	40	11	29	48.4	32.4	40.4	2.5	1.5	2.0	57
Black Tartarian	32¼	12⅛	27⅜	55.9	35.7	45.8	2.7	1.4	2.0	44
Banner	31¾	18	45	......	52.9	....	......	2.3	....	26*
Bavarian	33	15¼	46¾	72.1	44.9	....	2.9	2.8	2.6	47*
White Australian	32½	14¾	48¼	64.7	43.4	54.0	2.8	2.4	2.6	22
Rennie's Prize White	39	12	43½	57.4	35.3	46.4	2.6	2.2	2.4	42
Acclimatised Black Tartarian	30¼	15½	46	61.8	45.6	53.7	2.5	2.3	2.4	24
Pedigreed Black Tartarian	31¼	15¾	48¼	50.0	46.3	48.2	2.5	2.4	2.5	35
Black Champion	28½	16½	47½	55.9	48.5	52.2	2.7	2.4	2.6	29
Improved Scotch	30	9¼	46¾	22.1	27.2	25.0	3.2	2.3	2.7	87
Cluster or Triumph	37	13¼	43¾	60.3	39.0	49.6	2.5	2.2	2.3	33
Welcome	37	11	41	63.2	32.4	47.8	2.4	2.1	2.2	38
Early Calder	29½	13¾	41¼	63.2	40.4	51.8	2.7	2.1	2 4	30
Hungarian Black	31⅛	13½	30½	20.6	39.7	30.2	2.4	1.5	2.0	79
Port Adelaide	39½	12¾	30¼	25.0	37.5	31.3	2.3	1.9	2.1	76
Australian White	37¼	10½	42½	20.6	30.9	25.7	2.5	2.1	2.3	85
Prolific Black	30½	14½	44½	25.0	42.7	33.8	2.4	2.2	2.3	69
Danish	31¾	12¼	23¾	....	36.0	....	.....	1.2	....	65*
White Wonder	41⅞	14¼	31¾	....	41.9	....	......	1.6	....	52*

* Only one year's testing.

(8) OATS, DIFFERENT DATES OF SEEDING.

Six plots of Bavarian oats were seeded on three different dates, two plots being seeded each time. The soil was quite uniform on the whole range, consisting of clay loam with some vegetable mould and was manured at the rate of fourteen loads to the acre in the winter of 1889. Each plot was one hundredth of an acre in size, and grain was sown broadcast at the rate of two and one quarter bushels per acre. On April 22 the Bavarian oats were sown upon a soil of clay loam, also manured last winter but situated in another field. From this plot a yield at the rate of 44.9 bushels per acre was obtained.

TABLE No. XV shows the yields of oats at three dates of seeding.

Dates of seeding.	Separate plots.	Duplicate tests for each date of seeding.			Average of yields for each date of seeding.		
		Weight per measured bushel.	Straw per acre, tons.	Grain per acre, bus. by weight (34 lb.)	Weight per measured bushel	Straw per acre, tons.	Grain per acre, bus. by weight. (34 lb.)
		lb.			lb.		
May 1st...........	A	29.0	1.89	34.6	30.5	2.07	30.9
	B	31.9	2.24	27.2			
May 9th.	A	24.0	1.93	25.0	24.5	1.73	25.0
	B	25.0	1.53	25.0			
May 17th..........	A	21.0	1.68	19.1	21.5	1.66	19.1
	B	22.0	1.63	19.1			

(b) Cereals on Large Plots.

Over twenty varieties of grains were grown upon plots varying from one-third to one acre in size. These consisted of some of the most noted Canadian varieties but principally of the most promising of the 1889 crop from imported seed. The plots were made in field No. 9 of the farm, consisting of twenty acres. One half of this field received a good coating of farmyard manure in 1888 and the whole field was in corn during 1889. The manured part showed a very marked advantage in the corn crop over that part which was unmanured. During the present year the grain plots were run uniformly, so that each plot would contain one-half of the manured and one-half of that which had received no manure. The crops upon the two parts were very different in growth, that upon the manured part being taller in growth and producing more grain of a better quality. All plots were of the same length, being about forty rods long, and a path thirty inches wide was left between each two plots.

Three acres of pease, namely, the Mummy, Multipliers and Centennial were so affected by the wet weather in the early part of summer that the experiment proved unreliable for ascertaining the relative yields.

Could all these larger plots of grain have been sown about ten days earlier, we have no doubts there would have been a much larger yield, judging from the results of our smaller plots.

A description of these grains can in nearly every case be found in the tables of the smaller plots, and we will here simply give the yields per acre.

(9) BARLEYS, TESTS OF VARIETIES.

There are seven varieties of barley to report upon from the large plots. The land upon which these were grown, was a clay loam with a considerable amount of vegetable matter. The land was about as uniform as could be chosen for plots of such large size. The soil is so uneven over the greater part of this farm that it is very difficult to select parts which is as even as is desired for experiments. Especially when the plots are of such a large character. The difficulty of irregularity in soil can be more fully overcome in the smaller plots where sections can be selected of a much more even nature throughout.

The first five varieties were upon plots of one-third of acre each, and the two last varieties were upon acre plots. The soil of the acre plots was lower lying than that of the other plots, and consisted of a greater quantity of vegetable matter.

Table No. xvi shows the yields of barley per acre, from plots one-third of an acre and one acre in size.

Variety.	Yield per acre (bush. by weight, 48 lb.).
Improved Scotch	30
Italian Rice	21 4-5
Phœnix	30
Kalina	26
Oderbrucher	36½
Common 6-rowed	39
Carter's Prize Prolific	31½

(10) Spring Wheats, Tests of Varieties.

There were three varieties of spring wheat tested upon acre plots, but through some cause two of these varieties were missed from the tests of the smaller plots. The soil on which these tests were made, was perhaps as uniform as any section on the farm of the same area. The difference between the part which had received manure in 1888 and that which received none was great in case of the spring wheats, the advantage being much in favor of the manured part. Could these parts have been harvested and threshed separately, it would be of much value to have the comparative figures, but pressure of work made it impossible for us to accomplish this work satisfactorily. After being well cleaned, the first two named wheats gave a yield per bushel of 62 lbs. each, and the latter 61 lbs.

Tarle No. xvii shows the yield on each acre.

Variety.	Yield per acre.
Red Fern	17⅓
Rio Grande	11⅔
Manitoulin	15⅓

(11) Oats, Tests of Varieties.

The oat plots were in the central part of the field and were fairly uniform throughout. There are thirteen varieties upon which to report. These were the last that were sown in the field, and were about eight days later in being put in than those on the small plots, and we observe in our tests of different dates of seeding that the same varieties put in eight days after the first seeding on April 22, gave a yield of 31 per cent less, a fact which should be taken into consideration in comparing yields of the small and large plots.

The first ten varieties were put in plots of one-third acre each and the last three in plots of one acre each.

TABLE No. XVIII shows the yields of oats per acre of 13 varieties.

Variety.	Yield per acre (bush. by weight, 34 lb.).
Black Etampes	47.1
White Abundance	33.4
Flying Scotchman	23.5
Waterloo	38.7
Probsteier	41.3
Improved Besthorn	29.3
White Tartarian	39.1
Siberian	33.4
White Poland	49.2
Danebrog	39.3
Bavarian	41.0
American Banner	45.4
White Bonanza	29.6

2. POTATOES AND ROOTS.

Upwards of one hundred varieties of potatoes and roots have been tested upon small plots during the past summer. The seed of these varieties was mostly obtained from the Canadian seedsmen and the varieties are principally those which have been grown more or less over Ontario. The plots were situated on the south-westerly slope of field 17 of the farm. This field was under grass and pastured by sheep in the summer of 1889, and was plowed lightly in August of the same year and afterwards harrowed crosswise with the Corbin disc harrow. This was again plowed before winter set in. In the spring of the present year this land received a good coating of farmyard manure, and was again plowed and afterwards harrowed and drilled up for the potatoes and roots.

(12) POTATOES, TEST OF VARIETIES.

There were twenty-eight varieties of potatoes grown upon plots one twenty-seventh of an acre in size. These plots were about twelve rods long and there were three rows in each plot. Thirty inches were allowed between each two consecutive rows and between each two consecutive plots. The land which is a clay loam had been in sod the previous year. It was plowed in the autumn, top dressed with farmyard manure at the rate of 14 loadsper acre in the spring, and again plowed. Surface cultivation then took place and the potatoes dropped into drills made with the plow. The seed potatoes were cut into pieces containing two eyes each, but owing to heavy rains was of necessity left about five days before being planted after cutting was done. The seeding took place on and as soon as the plants were nicely up, the ground was lightly harrowed. Horse hoeing took place occasionally during the growing period, and two applications of Paris green in water were made upon the tops to destroy the bugs. The potatoes were carefully taken up with a potato digger in the autumn and weighed. The crop was not large, which was perhaps principally owing to the very wet weather in the early summer.

A small sample of each variety was sent to yourself, to Mr. Forsyth, the gardener, and to myself, to test the different varieties as to their relative value for table use. These tests were all made independently of each other and reported upon as may be seen in the table. The samples sent to yourself were taken from the crop of the large plots, while those sent to Mr. Forsyth and myself were taken from small single rows in another field the soil of which was also a clay loam but of rather a lighter nature.

TABLE No. XIX shows the yields and table quality of twenty-eight varieties of Potatoes.

Varieties. (In same order in which table quality was tested).	Table Quality.								Ripening.	Yield per acre, bus.	Comparative order of yield.
	Flavor.			Mealiness.			General appearance on plate.	Remarks.			
	By Professor of Agriculture.	By Foreman of Horticulture Dep.	By Assistant Supt. Experimental Dept.	By Professor of Agriculture.	By Foreman of Horticulture Dept.	By Assistant Supt. Experimental Dept.					
Early Puritan	Good	Good	Good	Good	Good	Medium	Fairly good	Somewhat above average in qualities.	Early	139½	4
Crown Jewel	Medium	"	Very good	"	Medium	Good	Medium	Above average in qualities.	"	70¾	20
Summit	"	Very good	Medium	"	Good	Medium	Whitish	Slightly above medium quality.	Late	137	6
Convoy	Very good	"	Very good	"	"	Good	"	Very fine Potato. This variety was grown in the garden.	...	...	...
London	Good	"	Poor	"	Medium	Medium	Reddish white	Medium qualities.	Early	135¾	7
Rose's New Invincible	"	Poor	"	Medium	Poor	Poor	Yellowish	Poor.	Medium	78	17
The Daisy	Medium	Very good	Very good	Good	Good	Good	Fairly White	An excellent table potato.	Early	157½	3
Clark's No. 1	"	Good	Good	"	"	"	Medium	Good potato.	Medium	139¼	5
Green Mountain	Very good	Very good	Medium	"	"	Medium	Darkish tinge	Slightly above average qualities.	"	79½	16
Early Maine	...	Good	Good	...	Medium	Good	Whitish	Good table variety.	Early	135¾	7
Stray Beauty	Good	Poor	Poor	Poor	Poor	Medium	Yellowish	Poor table variety.	"	49	24
Empire State	"	Good	...	Good	Medium	Medium to good.	Whitish	An excellent table potato.	"	162	1
Beauty of Hebron	Very good	Very good	Very good	"	Good	Good	White	Extra qualities.	"	99	12
White Elephant	"	Medium	Medium	Medium	Medium	Medium	Fairly white	Medium qualities.	Late	67	23
Early Sunrise	Good	Good	"	"	Medium		"	Fair qualities.	Early	69½	22
Rural Blush	...	Medium	Poor	...	"	Poor	Reddish cast	Generally poor.	Late	102¾	11
Halton's Seedling	Very good	"	Good	Good	"	Good	Medium	Good qualities.	Early	94¾	13
Dakota Red	Good	Poor	Medium	Medium	Poor	Poor	Very solid.	Poor potato.	Medium	77⅓	19
Early Ohio	Very good	Medium	"	Good	Medium	Medium	Fairly white	Medium qualities.	Early	45¾	25
Rosy Morn	Medium	...	Poor	Poor	...	Poor	Greenish cast	Rather poor potato.	"	77¾	18
Thorburn	Good	Very good	Very good	Good	Good	Good	Whitish	Excl't table potato.	Late	162	1
Rural New Yorker	Very good	Medium	"	"	Poor	"	Medium	Excl't table potato.	Early	129	9
Minister	Medium	Good	Very poor	"	Good	Medium	Fair	Course texture.	Late	70½	21
Pootaluck	"	Medium	Medium	Medium	Medium	"	Fairly light with a yellowish tinge.	Medium qualities.	Medium	106½	10
Late Rose	Very good	Good	Good	Good	"	"	Whitish	Fair qualities.	"	94⅓	14
Sweet St. Vernal	Good	Medium	Poor	"	"	Good	Medium	Medium qualities.	Late	87¾	15
Lady's Finger	...	...	...	...	...	...	...	...	...	...	...
Mrs. Foraker	...	...	...	...	...	...	...	...	Medium	25½	27

(13) TURNIPS, TEST OF VARIETIES.

There were in all forty-eight varieties of turnips, or rather forty-eight tests, as in a few instances the same variety appears from seed of different places. The rows were a little over eight rods long, and there were two rows of each variety. The rows were twenty-eight inches apart, and the turnips thinned to about fourteen inches in the row, or as near that distance as could be well done. Owing to the wet weather in June the turnips were not sown until the last week.

In the first table is given the results from the yellow and white fleshed turnips, and in the last table from the Swede turnips.

TABLE NO. XX shows the characteristics and yields per acre of 16 varieties of yellow and white fleshed turnips.

Variety.	Color of flesh.	Amount of tops.	Shape of roots.	Uniformity.	Number of turnips per acre.	Average weight per root.	Yield per acre.	Comparative order of yield.
						lb.	tons.	
Pearce's Invincible..........	Yellow ..	Medium..	Globe.....	Good	9,307	2.26	10.54	16
Purple Top Mammoth	White ..	"	"	Medium ..	13,530	3.36	15.83	9
Golden Ball	Yellow ..	Small....	"	" ..	8,364	2.60	10.89	15
White Globe	White ..	Large....	"	Good	6,847	4.56	15.62	11
Mammoth White...........	" ..	"	Elongated..	"	6,068	6.64	20.15	3
Grey Stone	" ..	Medium..	Globe......	"	11,275	3.45	19.48	5
Green Top Aberdeen........	Yellow ..	"	Elongated..	Medium ..	8,364	3.06	12.81	14
Purple Top Aberdeen	" ..	Large....	Globe	Poor	11,603	2.51	14.58	12
Early Six Weeks.....	White ..	Medium..	Elongated..	Medium ..	8,528	3.90	16.66	8
Waite's Eclipse Hybrid......	Yellow ..	Large	"	Poor	10,947	2.86	15.64	10
Flat White Dutch	White ..	Small ...	Flat	"	8,323	3.50	14.58	12
White Stone or Snowball....	" ..	Large	"	Good	8,487	4.52	19.20	6
Orange Jelly	Yellow ..	Medium..	Globe	Medium ..	9,348	4.10	19.16	7
Red Top Strap Leaf	White ..	Small....	Flat	" ..	9,266	4.46	20.68	2
Pomeranian White Globe ...	" ..	Large	Elongated..	" ..	8,610	4.59	19.80	4
Red Globe Norfolk	" ..	"	Flat	Good	7,790	6.81	26.52	

TABLE No. XXI shows the characteristics and yields per acre of 32 varieties of Swede Turnips.

Variety.	Quantity of tops.	Neck of roots.	Uniformity of roots.	Number of roots per acre estimated from small plots.	Average weight per root.	Yield per acre.	Comparative order of yield.
					lb.	tons.	
Bangholm	Medium	Medium	Good	15354	.96	7.34	30
Laing's Swede	Small	"	Medium	15826	.80	6.29	31
Green Top	Large	Short	"	15641	1.33	10.44	27
Skirvings	Small	"	Good	13653	1.81	12.38	24
Marquis of Lorne	Medium	Long	Medium	14555	1.43	10.39	28
Sutton's Champion	Large	Medium	Good	15211	1.48	11.36	25
East Lothian	"	"	"	15149	1.70	12.85	22
Scottish Champion	"	Short	"	15190	1.67	12.65	23
White Swede	"	"	Medium	8302	2.23	14.30	18
Marshall	"	Long	"	13919	2.13	14.82	15
Prize Winner	Small	"	Poor	18142	1.23	11.15	26
Hagard's Improved	Large	Short	Good	17753	1.68	14.95	14
Purple Top	Medium	Long	"	18839	1.49	14.04	20
Drummond's Improved	"	Medium	"	18921	1.49	14.10	19
Laidlaw's Improved	Small	"	"	19286	1.57	14.31	17
P. W. & Co. Improved Prize	Large	Short	Poor	17896	1.61	14.41	16
Carter's Imperial	"	Medium	Good	18819	1.79	16.81	11
Elephant (Steele)	"	Long	"	16482	2.23	18.35	6
" (Bruce)	"	"	"	10251	2.52	12.92	21
Fetticairn	"	Short	"	16441	2.54	20.91	2
Marshall	Small	Medium	"	17671	1.45	12.81	22
Rennie's Prize Purple Top	Medium	Long	Poor	16851	1.87	15.79	13
Simmer's Champion	Large	Medium	"	19311	1.72	16.54	12
Carter's Elephant (Simmer's)	"	Long	Good	18532	2.26	20.98	1
Royal Norfolk	"	"	"	18880	2.14	20.19	3
Hall's Westbury	"	"	Medium	18901	2.01	19.00	4
Marquis of Lorne	Small	"	Poor	16605	2.07	16.97	10
Steel Bros. Highland Prize	Large	"	Good	19639	1.76	17.26	9
Hazard's Swede Turnip	Medium	Medium	"	17794	2.10	18.72	5
Homefield	Large	Long	"	18532	1.90	17.55	8
Green Top	Small	Medium	"	17117	2.06	17.65	7
Purple Top	Large	"	"	7667	2.64	10.13	

(14) MANGELS, TEST OF VARIETIES.

Twenty-nine varieties of mangels were grown upon the plots during the summer of 1890. Each plot consisted of one forty-first of an acre, the rows were twenty-eight rods apart and the mangels thinned to fourteen inches in the row. Quite full notes were taken of the growth of these roots, but owing to a misfortune we are unable to present them, and consequently only include in the table the estimated number of mangels per acre as determined from the number of mangels on the plot of one forty-first of an acre, the average weight per mangel and the yield per acre in tons.

TABLE NO. XXII shows the average size of roots and yields per acre of 29 varieties of mangels.

Variety.	Number of mangels per acre.	Average weight per mangel.	Yield per acre.	Comparative order of yield.
		lb.	tons.	
Champion Yellow Winter	14842	1.40	10.35	20
Yellow Intermediate	11644	2.44	14.23	2
Mammoth Red Intermediate	13858	1.64	11.38	16
Imperial	17876	1.41	12.58	9
Long Yellow	13735	1.33	9.12	26
Long Red	14386	1.59	11.30	17
Norbitan Giant	16482	1.68	13.81	4
Gate Post	13571	1.72	11.66	14
Yellow Globe	13284	1.64	10.87	19
Maulen Orange	15539	1.51	11.77	13
New Giant	14596	2.00	14.62	1
Mammoth Long Red	15580	1.53	11.93	12
Carter's Golden Intermediate	9471	2.06	9.76	24
Lane's Improved	15662	1.72	13.49	5
Wane's Tankard	11767	1.12	6.58	28
P. W. & Co. Mammoth Long Red	14514	1.67	12.14	11
Yellow Globe	15539	1.62	12.61	8
Beck's Champion Yellow Globe	12792	1.69	10.30	21
Pearce's Clan Giant	16031	1.75	14.04	3
Red Globe	15375	1.62	12.42	10
Fisher Hobb's Yellow Globe	16072	1.64	13.20	6
Carter's Warden Prize Globe	12382	1.61	9.98	23
P. W. & Co. Golden Flesh Tankard	13038	1.32	8.61	27
Red Tankard	14063	.92	6.50	29
Giant Half Long	14309	1.84	13.14	7
Giant Yellow Globe	21894	1.46	10.95	18
Dudgeon's White Sugar Beet	11972	1.60	9.65	25
Bruce's White Sugar Beet	17302	1.18	10.21	22
White Sugar Beet	15088	1.52	11.46	15

(15) CARROTS, TEST OF VARIETIES.

Eleven varieties of field carrots were tested by having four rows, twenty-eight inches apart and eight rods long of each variety. The plants were thinned to from three to four inches apart in the row. Seven varieties were tested in 1889 and it is seen the Giant Short White or White Vosges has taken the lead each year.

TABLE No. XXIII shows the characteristics and yields of 11 varieties of carrots.

Variety.	Amount of tops.	Color of root.	Uniformity of roots.	Average length of carrot.	Average diameter of carrct.	Easy or hard to remove from soil.	Average weight per carrot.	Yield per acre.	Comparative order of yield.
				inches.	inches.		lb.	tons.	
Yellow Belgian	Medium	Light orange.	Medium	13½	1 5-9	Hard	.64	12.65	9
White Belgian	Large	White	Poor	12½	2	Medium	.67	16.64	3
Red Altringham	Small	Deep orange.	Medium	9	2	Medium-hard	.32	8.93	11
Intermediate	"	"	Good	8¾	2⅛	Medium-easy	.47	14.43	7
Long Orange	Large	"	"	13⅛	2⅛	Hard	.43	11.87	10
White Green Top Orthe	Medium	White	Medium	13⅛	2½	Medium	.74	16.53	4
Danvers Orange	Small	Deep orange.	Good	6¾	3	Medium-easy	.56	15.70	5
P. W. & Co. Giant Wiltshire White	Large	White	Medium	12¼	2¼	Hard	1.01	13.12	8
Peerless Orange Giant	Small	Light orange.	Good	10¼	2 4-5	Medium-easy	1.05	14.89	6
Mitchell's Perfected	Large	Deep orange.	"	9⅓	1⅞	Medium	.59	17.02	2
Giant Short or White Vosges	"	White	"	10	3¼	Easy	.85	17.78	1

3. FORAGE CROPS.

These experiments have been mostly confined to rape tests during the past season, although a few plots were sown to lucerne in the spring of the present year. An experiment in corn cultivation will be given under the heading " Co-operative Experiments."

(c) *Rape Experiments.*

Until the year 1889 almost no experiments were ever conducted in connection with rape cultivation in Ontario. Owing to the growing importance of this crop for feeding lambs in the autumn and early winter, a number of experiments have been conducted upon the experimental plots for the past two years.

In harvesting the rape knives were used and the plants were cut off on a level with the ground, and consequently the yield will be lighter than last year when the roots and tops were weighed together.

(16) INFLUENCE OF SALT WITH RAPE ON FOUR KINDS OF SOIL.

About seven years ago a plot was formed in the central part of the experimental field for the purpose of testing four kinds of soil under as near the same conditions as could be obtained. The whole plot is eight rods long by two rods wide, and is divided into four portions, each being two rods square. The soil is well supplied with tile drains. One end of the plot is a natural muck. The surface soil of the two central plots was removed to a depth of two feet and then one was filled with clay of a rather heavy nature and the other with marl intermixed with loam, while the remaining portion, being naturally a good clay loam, was left untouched.

In the spring of 1888, each portion was divided into two equal parts, and boards placed edgeways in the ground at the division and extended from one end of the plot to the other.

The accompanying diagram will illustrate the position of the soils and the divisions :

SALT.	SALT.	SALT.	SALT.
LOAM.	MARL.	CLAY.	MUCK.
NO SALT.	NO SALT.	NO SALT.	NO SALT.

The treatment of the plot throughout was similar until the spring of 1888, when salt was applied at the rate of 400 lb. per acre on the soils of one side of the division through the centre, while the remaining half of each soil was left without salt. Barley was sown upon the whole plot and results presented in the College Report of 1888. In the spring of 1889 salt was again applied at the rate of 400 lb. per acre upon the same portions as in 1888 and oats sown over the whole plot.

In the summer of the present year rape was sown upon these plots in drills twenty-two inches apart. No addition of salt was made and the result of the rape experiment shows the influence of salt in the second year's crop after application. The rape was thinned to about five inches apart in rows.

The results of crops for the last three years are given in the table, as they are very interesting and also of much practical value.

TABLE No. XXIV shows the results of crops grown upon four kinds of soil, with and without the application of salt, for the past three years.

	Salt or no salt.	1888. Yield of barley.		1889. Yield of oats.		1890. Yield of rape.	Yield per acre.		
		Grain, per plot.	Straw, per plot.	Grain, per plot.	Straw, per plot.	Rape, per plot.	1888. Barley.	1889. Oats.	1890. Rape.
		lb.	lb.	lb.	lb.	lb.	bus.	bus.	tons.
Loam	Salt.....	21¼	23¾	23½	58	236	35½	55⅓	9.45
	No salt...	21	21½	22¼	50	164	35	52⅓	6.56
Marl.....	Salt	11¼	36¼	16¼	68¼	168	18¾	38¼	6.72
	No salt. .	10½	31½	15½	41	98	17½	36½	3.92
Clay	Salt......	16¾	15¼	20½	57½	70	28	48¼	2.81
	No salt...	12¼	17¾	17½	45	60	20½	41⅙	2.40
Muck	Salt......	11¼	15¼	....	....	119	18¾	....	4.77
	No salt...	7	20	....	....	107	11⅔	....	4.28

(17) RAPE UPON FLAT AGAINST RIDGED LAND.

Twelve plots of rape were grown upon land, one-half of which had been previously drilled up and one-half of which had been left level. Seed was sown at the rate of four lb. per acre, and after coming up the young growth was treated as follows:—Two plots in each half were left untouched; two plots in each half were thinned so that the rape plants stood on an average of four inches apart; and the remaining two plots upon each half were thinned so that the plants were six and one-half inches apart. The rows were twenty-two inches apart, and the same cultivation was given the various plots throughout the season.

TABLE No. XXV shows the average of duplicate results from growing rape upon ridged and flat soil, with planting thick and thin.

Cultivation.	Thinnings.			Average yield per acre. lb.
	¾ inch apart.	Thinned to 4 in. in row.	Thinned to 6½ in. in row.	
	Yield per acre. lb.	Yield per acre. lb.	Yield per acre. lb.	
Ridged land..............................	9855	7245	8460	8520
Level land.....	12105	10530	7650	10095

(18 FERTILISERS UPON RAPE.

Twenty-four plots were grown with rape and salt superphosphate, dried blood and scrap, sodium nitrate and fresh wood ashes were applied in varying quantities, and both to the plant and to the soil, but as the conclusions might be somewhat misleading as the tests were not made in duplicate, it seems best to merely present the average of the four plots with each fertiliser, and also the average of the four plots with no manure. The fertilisers were applied when the plants were about one-third grown, and the crops were cut off even with ground in harvesting and carefully weighed.

TABLE NO. XXVI shows the yields of rape per acre in lbs. from the application of fertilisers.

Fertiliser.	Quantity of fertiliser per acre.	Yield of rape per acre estimated from average of 4 plots in each case.	Fertiliser.	Quantity of fertiliser per acre.	Yield of rape per acre estimated from average of 4 plots in each case.
	lb.	lb.		lb.	lb.
Salt..................	300	17370	Sodium nitrate..........	150	20025
Superphosphate..........	300	16223	Fresh wood ashes..	750	16223
Dried blood and scrap....	300	18068	No fertiliser.............	....	16088

(19) RAPE THINNED TO DIFFERENT DISTANCES WHEN GROWING.

Twelve plots were sown with rape in ridges twenty-two inches apart, and with seed at the rate of four pounds to the acre. These twelve plots were divided into six sets, with two plots in each set. The rape on each of the plots in No. 1 set was thinned so that the plants averaged fifteen inches in the row; No. 2 set, twelve inches in the row; No. 3 set, nine inches in the row; No. 4 set, six inches in the row; and No. 5 set was left unthinned. The thinning did not take place until the plants were about one-third grown, and perhaps had it been done earlier in the season each plant might have made greater development by having more room.

TABLE NO. XXVII shows results from different thinnings.

Distances apart of plants in row.	Yield of rape per acre in pounds. Estimated from plot.		
	Test No. 1.	Test No. 2.	Average.
15 inches....................................	5250	5760	5505
12 "	6000	6900	6450
9 "	6540	8100	7320
6 "	10200	10680	10440
Unthinned, seed at 4 lbs. per acre................. ...	27633	27120	27376.5

(d) Permanent Pasture Grasses.

A number of grasses have been grown upon the experimental plots for a number of years, both singly and as mixtures. The object in Ontario should be to pasture as much stock on land devoted to pasture each year as possible, with the partial soiling and ensilage systems, which are coming in use so much at the present time, a smaller area of pasture land is needed than formerly, but this should be of the best that can be obtained.

A considerable portion of the seeding on this farm is now done with a mixture of grasses and clovers, even when intended to stand for only two or three years. The grasses which would stand well here might do well in many other localities over Ontario. We will very briefly notice some of the English grasses as grown by us a number of years and observe their hardiness of each.

(20) Grasses grown singly.

Grasses were sown singly upon plots one-twentieth of an acre in size in the spring of 1883. The soil was a mild clay loam with a considerable quantity of vegetable matter. The crop has been mostly cut with the horse mower for hay, but has also been pastured off by sheep. Some of the grasses have completely disappeared while others are holding out remarkably well.

Table No. xxviii shows the results of the eighth season's test of grasses sown singly upon plots.

——	Durability for eight years.	Remarks.
Meadow Foxtail	Holding well	Earliest of all the grasses.
Timothy	Disappeared	Gone in about three years.
Perennial Rye	“	“ “ “ “
Italian Rye	“	“ “ two “
Wood Meadow Grass	Holding well	Close matting of fine grass.
Rough stalked meadow grass	“ “	“ “ “ “
Various leafed Fescue	“ “	Grows to about 23 inches, a little bunching.
Sheep's Fescue	“ “	“ “ 20 “ fine wiry leaf.
Hard Fescue	“ “	“ “ 18 “ very thick mat.
Fine leafed Fescue	Medium	“ “ 12 “ very bunchy.
Large leafed Fescue	Nearly gone	Strong plants growing here and there.
Tall Fescue	Medium	Grows to about 36 inches, few heads.
Red Fescue	Holding well	“ “ 11 “ short and thick.
Sweet Vernal	Disappeared	Gone in second year.
Crested Dog's Tail	“	“ “ “

(21.) Grasses Grown in Mixtures.

A number of plots have been sown with mixtures for the last eight years, there being one, two or more plots put in nearly every year. From several years' observations the following varieties are the most reliable for this locality:

Meadow Foxtail,
Orchard Grass,
Kentucky Blue,
Meadow Fescue,
Tall Oat,
Wood Meadow Grass.

A number of the fescues are also very hardy, but are much finer in growth. The first four varieties named, along with red and alsike clovers, would make an excellent pasture for three or four years or more, and if the crop were carefully handled would make a large amount of good hay. We took this year 3.86 tons of fine hay from two acres of grass land seeded with a mixture in 1886 and which has been pastured very heavily since that time.

It is found to be the best to seed in the spring of the year, as some of the young and tender grasses are liable to become destroyed during the first winter, unless they get a good rooting the year before.

4. Co-operative Experiments.

During the past few years some very interesting and valuable experiments have been conducted over the province by members of the Ontario Agricultural and Experimental Union and other leading agriculturists. The principal object has been to obtain a better practical knowledge of some of the most easily procured Canadian fertilisers. The Union has forwarded from the experimental department of the institution material for the tests, free of charge, to those desirous of undertaking the experiments, and the very enthusiastic manner in which this work has been taken hold of by college associates and others has almost surpassed our expectations. The number of experiments has become greater each season, and the number of those carrying on the tests has increased about eight fold during the last three years. It has been my aim from the very commencement of this co-operative work in 1886 to give all the assistance and encouragement possible to this line of work, knowing the great advantage of these experiments to those who conduct them, and also to the whole farming community. With a soil and climate so varied as we have over the province of Ontario it is very evident that experiments conducted with fertilisers, newly-imported cereals, different modes of cultivating corn, etc., are much limited in their value as close guides for the majority of farmers of Ontario. I have been looking forward for the past three years with the expectation that in the near future this all important co-operative experimental work would be placed upon a more elaborate system of operation; that there would not be individuals engaged at this work alone, which they have been doing at their own expense, but that there may be a number of branch experiment stations over this agricultural country. Surely there need be no greater evidence of the need of branch stations than the enthusiastic manner in which the members of the Experimental Union have been engaged at these co-operative experiments. This plan of branch station work is being carried into effect in several of the American states with much success, and who can doubt but it would meet with equal success in our own land and be of inestimable value to the farmers of Ontario.

The following is the front page of a circular sent to experimenters over Ontario during the past spring. Instructions and blank forms for the experiments made up the remaining part of the circular.

Ontario Agricultural and Experimental Union.

Guelph, March 1st, 1890.

Dear Sir,—Experiments carefully carried on have done much towards improving the methods of farming. With this fact in view the Ontario Agricultural and Experimental Union has been carrying on co-operative experiments from year to year, which have been gradually growing in importance and value. Those proposed for this year's work should be appreciated by every farmer. If you can give the small amount of time and careful attention required to carry on one or more of these tests, you will be amply repaid for the trouble taken by yourself by the conclusions arrived at on your own farm. You will also have the benefit of the results of similar experiments conducted in different parts of the province, all of which, when carefully carried out, will be presented at the annual meeting of the Association, and afterwards entered in the annual Report of the Union, a copy of which will be sent to each experimenter.

The experiments for this year are as follows :

(1) A continuation of the test with superphosphate, dried blood and scrap, farmyard manure, and no manure, with oats, applied without additional fertiliser.

(2) New plots with superphosphate, dry blood and scrap, farmyard manure, and no manure with oats.

(3) Application of sodium nitrate to either spring wheat or fall wheat, to be applied in the spring at the rate of 200 lbs. per acre.

(4) Testing new varieties of cereals.

(5) Diffierent modes of cultivating corn similar to 1889.

(6) The growing of lucerne.

Full particulars for carrying out the above experiments are contained in this circular.

Fertilisers and seeds required for the tests will be sent free of charge to your nearest express office.

The materials for Nos. II., III., V. and VI. being expensive, only a limited number of these can be sent out. Those applying first will of course have the preference.

If you are in a position to carry on one or more of these experiments, kindly let us know by the 25th instant which test or tests you prefer, mentioning your nearest express office, so that the materials shall reach you in time.

Kindly forward all communications regarding experiments to C. A. Zavitz, O. A. College, Guelph, by October 20th, 1890.

Yours sincerly,

AGRICULTURAL COMMITTEE.

The material and instructions for the different experiments and the blank forms on which to return reports were sent from here during the spring of the year just closing, partly at the expense of the Experimental Union and partly at the expense of the Experimental Department of this institution, The following is the number of plots for which material was sent to those experimenting.

Experiment No.	I.	No additional fertiliser required.	
" "	II.	48	plots.
" "	III.	34	"
" "	IV.	170	"
" "	V.	44	"
" "	VI.	58	"

The greater number of the results from the summer's work are now received, and when they are all to hand, will be summarized and presented at the annual meeting of the Association in February next.

We feel it not only a duty but also a pleasure to here give a list of those ex-students and other farmers who have taken hold of this work during the past season. Experimental work of this kind takes considerable thought and care, and some extra labor to carry it on properly, and we think much credit is due to those who have sent in good reports in the past. The reports of the present season give indications of surpassing all those of the previous years. From letters received we are led to believe that much advantage has been derived by the experimenters themselves in obtaining a better knowledge of their own soil and its requirements, and the results of all the experiments when summarized will be made to add valuable matter to the collected reports of the Union of the four previous years, as presented in the annual report of the association.

The following is a list of experimenters for 1890 :—

Names of experimenters.	Counties.
Alexander, R. C	Middlesex.
August, William	Dufferin.
Ballantyne, W. W	Perth.
Birdsall, F.	Hastings.
Birdsall, W. G.	“
Birdsall, William	“
Bowman, C. D.	Waterloo.
Bristow, G. B	Grey.
Brown, P. J	Digby.
Brown, R. M.	Grey.
Burwash, H. A.	Bruce.
Buchanan, William	Huron.
Cameron J. M	Hastings.
Carruthers, P	Haldimand.
Christy, G. V	Prince Edward.
Clapp, W	“
Cousineau, J. B	Ontario.
Cuppage, J	Simcoe.
Dawson, H.	Wellington.
Drummond, J. M	Peterborough.
Farlinger, F. E	Dundas.
Flemming, F. A	York.
Goldthrop, W. M	Muskoka.
Grant, R. S	Haldimand.
Grey, J	Peel.
Guest, J	Simcoe.
Hartman, W.	Grey.
Henry, J.	Simcoe.
Hodge, G. F	Ontario.
Hunter, J	Lambton.
Job, J. R.	Wentworth.
Jeffs, H. B.	Simcoe.
Kennedy, J	Lincoln.
Kitchen, B. E	Norfolk.
Lett, R	Renfrew.
Lick, E	Ontario.
Marsh, G. F	Grey.
Mattice, G. L	Stormont.
McKay, J. E	Bruce.
McMartin, D. A	Stormont.
McNiven, W. J	Bruce.
Monteith, N	Perth.
Morgan, R	Middlesex.
Moyer, D	Lincoln.
Mowbray, William	Lambton.
Muir, J. B	Bruce.
Muma, J	Middlesex.
Nancekivell, W	Oxford.
Pike, L	York.
Quinn, William	Victoria.
Raynor, T	Prince Edward.
Redmond, J.	Peterborough.
Reed, D.	Wentworth.
Rendall, William	Grey.
Shuh, F.	Ontario.
Sherriff, G. G	Russell.
Smith, E. P	Durham.
Smith, J. D	“
Snyder, G.A	Lincoln.
Sprague, J. A.	Prince Edward.
Stone, J. B	Northumberl'd.
Varcoe, J. A. S	Huron.
Walker, E	Muskoka.
Walker, S	Huron.
Zavitz, E. M	Middlesex.
Zavitz, William	“

As the details and summaries of the union experiments as conducted during 1889 and presented at the last annual meeting of the association are enclosed in the thirteenth annual report of the association, which is embodied in the latter part of this volume, but little will be given here of the results. Two experiments conducted the present year by the experimental department, and which are not recorded elsewhere, will be here given

(22) Superphosphate, Dried Blood and Scrap, Farmyard Manure, and no Manure with Oats.

Instructions for No. II. Experiment as sent to each Experimenter.

(1) Select a piece of ground of same nature throughout, and representative as far as possible of the land of the neighborhood. Avoid naturally rich soils or those which have

had recent applications of manure or special cultivation. Keep clear of wet spots, trees, fences and buildings. Give cultivation to experimental plots similar to that of your larger fields. *An advantage would be gained if the plots could be chosen in such a position that they could remain for experiment another year.*

(2) Mark off four plots of one-fortieth of an acre each, leaving a clean path two feet wide between the plots. Two rods square is a convenient shape.

(3) Submit all plots to same treatment, and sow one-fourth of grain sent on each Aim at seeding one inch deep.

(4) Apply the superphosphate sent to plot No. I. ; the dried blood and scrap sent to No. II. ; the farmyard manure to No. III., and leave No. IV without any manure. The fertilizers to be sown at the time of seeding.

(5) Keep plots at all times clear from trespassing by poultry, etc.

(6) Aim at sowing 700 lb. farmyard manure on No. III. plot (14 tons per acre.)

(7) If it is your wish to carry on this experiment, please inform the Secretary, as named on front page, naming your nearest express office, and there will be sent to you, expressage prepaid, 7½ lb.... ....oats ; 10 lb. superphosphate for plot No. I., and 10 lbs. of dried blood and scrap for plot No. II.

(8) Fill out blank form and return according to directions on front page. NOTE.—The price of the superphosphate is about $30 per ton, and the dried blood and scrap $40 per ton.

TABLE No. XXIX shows results of Fertiliser test upon Experimental plots, 1890.

Fertiliser.	Yield of straw, tons per acre.	Yield of grain, bus. per acre.
Superphosphate, 400 lb. per acre..	.830	15.29
Dried blood and scrap, 400 lb. per acre.......................... ...	.990	15.29
Farmyard manure, 14 tons per acre...........	1.243	15.44
No manure.. ...	.685	11.78

(23) DIFFERENT MODES OF CORN CULTIVATION.

Instructions for No. V. Experiment, as sent to each Experimenter.

(1) Select a piece of ground of same nature throughout, under same conditions, and representative as far as possible of the land of the neighborhood. Avoid naturally wet spots, and keep clear of trees, fences, and buildings. Prepare the ground as you would a large field for the same crop.

(2) Mark out four plots of one-tenth of an acre each, allowing a clean path between the plots. Four rods square is a convenient shape for each plot.

(3) Sow the corn received in the following manner :

No. I plot—Drills of equal distance apart (as near 3½ feet as possible) with seed averaging two grains to the foot.

No. II plot—Drills of same distance apart as No. I, with seed averaging 12 grains to the foot.

No. III plot—Broadcast or close drills with seed averaging one-half bushel per acre (2.8 lbs. per plot.)

No. IV plot—Same as No. III with seed averaging three bushels per acre (16.8 lbs. per plot.)

(4) Aim at having the seeding all done in one day, and not later than 15th day of June. Note.—Shallow planting for early seeding, and deeper planting if late enough for soil to be warm.

(5) Give plots I and II the same amount of after cultivation, as often as you think they need it, but avoid mounding the rows; shallow cultivation is preferred.

(6) Cut each crop at the time when its condition corresponds to the roasting condition of field corn, or when the ears are in the glazed state.

(7) Weigh produce from the plots when under as equal conditions as possible. Note.—If you can observe the comparative results from the feeding of the different lots please send information under head of "Conclusions" in blank form.

(8) Fill out accompanying blank form and return according to directions on front page.

Table No. xxx shows the result of Corn test upon Experimental plots, 1890.

Seeding and cultivation of crop.	Yield per acre, tons.
Wide drills, 2 grains per foot	16.87
Wide drills, 12 grains per foot..	15.60
Broadcast or close drill, 2.8 lbs. per plot (one-half bushel per acre)....................	10.37
Broadcast or close drill, 16.8 lbs. per plot (three bushels per acre)................	19.32

II.—LIVE STOCK EXPERIMENTS.

(24) Corn Ensilage as a Food for Making Beef.

An experiment on the fattening of steers with ensilage and meal; ensilage, hay and meal; and roots, hay and meal, was conducted in the early part of the present year.

Six grade steers, which had been bought by the farm department on October 19th, 1889, were used for the experiment. They were all slightly over three years old when the experiment was commenced. From the time the animals reached the farm until the test started they were kept under the same treatment and food until the last week, when they were divided into three groups, of two animals in each group, and fed their respective rations as a preparation for the experiment.

Table No. xxxi shows the breeding of the animals in each group and the quantity of food which we purposed to give each animal of each group, as nearly as the peculiarities of the several animals would allow.

Breeding.	Group I.		Group II.		Group III.	
	1	2	1	2	1	2
	S. H. grade.	S. H. grade.	S. H. grade.	S. H. grade.	Pure S. H.	S. H. grade with touch of Ayrshire blood.
Daily average quantity of food per animal aimed at in the experiment.	Ensilage, all that would be eaten. Meal, 12 lbs.		Ensilage, 45 lbs. Hay, all that would be eaten cleanly. Meal, 12 lbs.		Roots, 45 lbs. Hay, all that would be eaten cleanly. Meal, 12 lbs.	

The experiment proper was commenced on Dec. 31st, 1889, with the two animals of each group in a double stall. Feeding took place at 5 a. m., 11 a. m. and 5 p. m., and watering at 8 a. m., 1 p. m. and 4 p. m. Grooming was done five times weekly. The stable in which the animals were kept was comfortably warm, there being almost no frost present throughout the experiment.

The following notes are upon the character of food given :—

Ensilage.—The ensilage was made from fodder corn, and was of excellent quality for the first seven weeks after which time it was not as good owing to the corn being more immature when put in the silo.

Roots.—The roots consisted of turnips which were pulped, and mixed with the other feed.

Hay.—The hay consisted of timothy and clover in about equal parts. The hay was only medium in quality.

Meal.—The meal consisted of equal parts by weight of peas, barley and oats.

The different constituents of the feeding ration were all mixed together before feeding, and everything excepting bedding and water was weighed before being put before animals and the refuse left over if any was again weighed, before more feed was given.

The experiment commenced on Dec. 31st, 1889, and closed on April 29th, 1890, thus making in all 119 days.

TABLE No. XXXII shows the weight of each animal during each week of the experiment.

Dates.	Group I.		Group II.		Group III.	
	Steer No. 1.	Steer No. 2.	Steer No. 3.	Steer No. 4.	Steer No. 5.	Steer No. 6.
December 31st	1,515	1,327	1,469	1,393	1,477	1,341
1st week	1,533	1,328	1,477	1,390	1,485	1,371
2nd "	1,517	1,331	1,504	1,375	1,527	1,401
3rd "	1,536	1,343	1,484	1,411	1,488	1,369
4th "	1,559	1,352	1,512	1,412	1,523	1,400
5th "	1,584	1,369	1,531	1,434	1,547	1,418
6th "	1,591	1,377	1,540	1,443	1,539	1,420
7th "	1,613	1,405	1,561	1,457	1,581	1,432
8th "	1,627	1,391	1,578	1,479	1,591	1,449
9th "	1,642	1,420	1,577	1,498	1,605	1,478
10th "	1,669	1,431	1,617	1,514	1,610	1,475
11th "	1,671	1,429	1,614	1,529	1,618	1,489
12th "	1,671	1,433	1,622	1,541	1,645	1,494
13th "	1,697	1,446	1,634	1,543	1,642	1,506
14th "	1,701	1,461	1,644	1,565	1,649	1,507
15th "	1,718	1,487	1,664	1,586	1,651	1,483
16th "	1,759	1,515	1,680	1,600	1,675	1,510
17th "	1,762	1,520	1,691	1,613	1,696	1,526
Total increase per animal, 119 days	247	193	222	220	219	185
Total increase per group, 119 days.	440		442		404	
Average daily increase per group, 119 days	1.847		1.857		1.697	

The food was all eaten up cleanly except the ensilage of which there was an average of 18 lb. left for each animal of the first group, and an average of 13½ lb. for each animal of the second group. This, however, was given to other animals not under experiment, and was nearly all eaten by them.

TABLE NO. XXXIII shows the amount of each kind of food given to each animal for the separate weeks of the experiment.

Weeks of experiment.	Group I.				Group II.						Group III.					
	Steer No. 1.		Steer No. 2.		Steer No. 3.			Steer No. 4.			Steer No. 5.			Steer No. 6.		
	Meal.	Ensilage.	Meal.	Ensilage.	Meal.	Ensilage.	Hay.	Meal.	Ensilage.	Hay.	Meal.	Roots.	Hay.	Meal.	Roots.	Hay.
1st week	84	525	84	525	84	315	63	84	175	63	84	315	84	84	315	84
2nd "	84	525	84	525	84	315	63	84	175	63	84	315	84	84	315	84
3rd "	84	588	84	525	84	315	63	84	315	63	84	315	84	84	315	84
4th "	84	588	84	525	84	315	63	84	315	63	84	315	84	84	315	84
5th "	91	588	91	525	91	315	84	91	315	84	91	315	98	91	315	98
6th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
7th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
8th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
9th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
10th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
11th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
12th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
13th "	91	588	91	525	91	315	84	91	315	84	91	315	126	91	315	98
14th "	91	588	91	525	91	252	84	91	252	84	91	210	105	91	210	84
15th "	91	588	91	525	91	252	84	91	252	84	91	210	105	91	210	84
16th "	91	588	91	525	91	252	84	91	252	84	91	210	105	91	210	84
17th "	91	588	91	525	91	252	84	91	252	84	91	210	91	91	210	84
Total food given to animals, 119 days	1,519	9,970	1,519	8,925	1,519	5,103	1,344	1,519	4,823	1,344	1,519	4,935	1,848	1,519	4,935	1,554
Average daily food given to each animal, 119 days	12.7	83.8	12.7	75	12.7	42.9	11.3	12.7	40.5	11.3	12.7	41.5	15.5	12.7	41.5	13.1

TABLE NO. XXXIV shows the average amount of daily food given to each animal.

Feed.	Group I.	Group II.	Group III.
Meal	12.7	12.7	12.7
Corn Ensilage....	79.4	41.7	....
Roots	....	....	41.5
Hay	....	11.3	14.3

The estimated value of steers on December 31st, 1889, was 57.50 or 4¼ cts. per lb.

The value of feed for the period was meal, ⅞ cents per pound ; corn ensilage, $2.50 per ton ; roots, 8 cents per bushel ; and hay, $6.50 per ton. These valuations were taken from Guelph market prices with exception of corn ensilage and roots.

TABLE No. XXXV shows the average increase in the weight of the animals of each group.

——	Group I.	Group II.	Group III.
Average weight at commencement	1421	1431	1409
Average weight at close	1641	1652	1611
Average total gain	220	221	202
Average daily gain	1.847	1.857	1.697

The steers were sold on May 16th, at 5¾ cents per pound live weight, after the animals were lying in the yard all night without food, and weighed at 8 a.m. the following morning.

Weight before fasting	10,149	lb.
" after 12 hours fast in yard	9,763	"
Loss in weight	386	"

(25) FATTENING LAMBS.

An experiment in which forty-eight lambs were fed for two months upon rape in the field and for two months upon dry fodder in the shed, was commenced on October 10th, 1889, and closed on February 10th, 1890. The lambs were purchased just before the experiment was commenced and were weighed on October 10th.

TABLE No. XXXVI shows where the lambs were obtained, the number in each lot, price paid, the weights of the different lots on October 10th and the cost per hundred.

Lambs bought October, 1889, from	Number of lambs.	Price paid per head.	Total cost.	Total weight.	Cost per hundred.
		$ c.	$ c.	lb.	$ c.
Auld	20	3 95	79 00	1,920	4.11 11-24
Jerow	7	4 00	28 00	658	4.25 13-22
Anstie	8	3 37½	27 00	687	3.93 3-22
Rennie	13	3 90	50 70	1,347	3.76 7-18

The lambs were nearly all Coltswold and Oxford-Down grades, but a few Leicester and Shropshire grades were among the number. The rape field contained eight acres, and the lambs were unable to eat more than about one-half of the crop when they had to be removed on December 3rd on account of severe weather.

Weight of 48 lambs on October 10th	4,612	lb.
" 48 " December 10th	5,476	"
Gain of 48 lambs in the 62 days of the experiment	864	"

The lambs were kept in the shed from December 10th, 1889, until February 10th, 1890, and all the food given them was very carefully weighed and noted except the hay, which could not well be done. They received of sliced turnips 85 bushels and of whole oats 31 1-10 bushels. During the last part of the experiment one lamb was found lying on its back dead.

Weight of 48 lambs on December 10th, 1889	5,476	lb.
" 47 " February 10th, 1890	6,020	"
Gain of 48 lambs for 59 days (less a 140 lbs., lamb which died).	544	"

The price received for the lambs on March 14th and 22nd was 5¾ cts. per lb. Thus the results would be as follows :—

Cost of 48 lambs on October 9th, 1889	$184	70
Price realised for 47 lambs on March 14th and 22nd	370	30
Total gain	185	60

(26). CORN ENSILAGE AND ROOTS AS FOOD FACTORS IN SWINE FEEDING.

An experiment was conducted with store pigs averaging 204.5 lb. each, for the purpose of gleaning some information as to the value of corn ensilage and of roots as factors in the economical feeding of swine. The experiment was commenced on January 10th, 1889, and closed on March 28th, 1890, making in all a duration of 77 days.

TABLE No. XXXVII shows the division of the animals into groups and the quantities of food which were to be fed as far as circumstances would allow.

Animals in experiment.	Number of each group.	Animals in each group.	Class of Animals	Amount of feed eaten by animals in each group.
9	1	1	Barrow	All the meal they would eat without waste.
		2	Small sow.	
		3	Large sow.	
	2	1	Barrow	One-third as much meal as was given to group No. 1, mixed with all the sliced turnips they would eat.
		2	Small sow.	
		3	Large sow.	
	3	1	Barrow	One-third as much meal as was given to group No. 1, mixed with all the corn ensilage they would eat.
		2	Small sow.	
		3.	Large sow.	

The animals were from three litters, there being a representative from each litter in each group. Two weeks were allowed after the pigs were placed in their respective pens and the feeding ration of the experiment was first given, as a preparatory period. The meal consisted of one part wheat middlings, one part each of oats and peas ground, and two parts of pea meal, all mixed together. The meal was always mixed with water in the trough at time of feeding. The roots consisted of sliced turnips, which were sprinkled with the meal before being fed. The ensilage was made from fodder corn, and was of very good quality, considering the corn had been somewhat immature when cut. The meal was also mixed with the ensilage before given to the pigs.

TABLE No. XXXVIII shows the weight of each group of animals at the commencement and at the close of the preparatory period.

Group.	Weight at commencement.	Weight at close.	Average gain or loss.
1.............................	618.5	655.5	37
2.............................	583.5	595.5	12
3.............................	602.5	590.5	-12*

*The pigs in No. 3 group did not eat the ensilage well at the commencement.

TABLE No. XXXIX shows the average amount of food given per day to each group of animals throughout the experiment.

Group.	Meal.	Roots.	Ensilage.
1..........................	16½ lb.	5½ lb.	5½ lb.
2..........................	....	60 "	....
3..........................	....	....	35 lb.

The feed of each group was eaten up without waste except the ensilage of group No. 3 which was only partly eaten, but was all picked over and chewed up.

TABLE No. XL show the weekly weights of each animal throughout the experiment.

—	Group I. (Meal.)			Group II. (Meal and roots.)			Group III. (Meal and ensilage).		
	Barrow.	Small sow.	Large sow.	Barrow.	Small sow.	Large sow.	Barrow.	Small sow.	Large sow.
January 10th...........	251	212.5	192	203	200	192.5	201½	212½	176½
1st week	265	217	199	216	210	204	206	215½	182
2nd "	273.5	231	207	218.5	214	206	209	219	186
3rd "	282	233	215	221	216	206	212	221	187
4th "	290	251	226	227	221	211	213	224	189
5th "	300	261	234	227	232	214	217	224	193
6th "	300	268	238	237	226	215	219	225	194
7th "	312	279	249	245	234	228	223	230	199
8th "	319	273	250	248	237	223	225	226	199
9th "	331	287	262	252	236	224	224	227	195
10th "	341	300	271	260	243	231	229	230	203
11th "	347	306	273	263	246	226	232	229	210
Total weight at close of experiment	926.5			736.5			671		
Total increase during the experiment	270.5			139.5			80.5		
Daily average increase..	1.170			.604			.348		

The experiment proper was closed on March 28th, at which time the animals of group I. were sold for 5¼ cents per pound, live weight. The other six pigs were fed for 41 days longer upon a ration of meal similar to the one given before, of which an average of 22 lb. was eaten daily by each group. The daily increase for this period was as follows :—Animals in group No. II 1.58 lb. and animals in group No. III 1.95 The six pigs were sold on May 9th at 5¼ cents per pound live weight.

(27) FEEDING SWINE ON GRAIN AND MEAL.

An experiment was conducted with pigs, averaging about 50 lb. each, to test the value of a meal mixture composed of ground peas two parts, ground oats one part, ground barley one part and wheat middlings one part ; against a ration of peas and barley in equal quantity ground, and peas and barley in equal quantity whole. The experiment was commenced January 17th, and ended May 31st. The respective rations were given to the groups one week before the experiment started for a preparation period, previous to which time they had been fed similarly for twenty-nine days.

TABLE NO. XLI shows the arrangement into groups and some features relating to both the animals and the food given.

Groups.	Breed.	Date of farrowing.	Class of animal.	Food rations.	Preparation of food.	Manner of giving water.
		1889.				
I.	3 Berkshire grades....	Oct. 4..	2 barrows. 1 sow	Peas, 2 parts .... Oats, 1 part	Ground grain...	Meal and water mixed.
	1 Pure Berkshire	Sept. 13..	1 sow..	Barley, 1 part....... Wht. middlings, 1 part.		
II.	3 Berkshire grades....	Oct. 4..	2 barrows. 1 sow	Peas, 1 part	Ground grain...	Meal and water mixed.
	1 Pure Berkshire ...	Sept. 13..	1 sow	Barley, 1 part		
III.	3 Berkshire grades....	Oct. 4..	2 barrows. 1 sow	Peas, 1 part	Whole grain...	Whole grain and water given separately.
	1 Pure Berkshire	Sept. 13..	1 sow	Barley, 1 part		

Feeding took place three times daily, and at the following hours : 8 a.m., 1 p.m. and 5 p.m. Each group was fed all it would eat without waste. In mild weather the pigs were allowed in the yards for exercise every three or four days.

TABLE NO. XLII shows the amount of food eaten by each group during the 134 days of the experiment.

Periods.	Days.	Food eaten by each group.		
		Group I.	Group II.	Group III.
January 17th to February 14th	28	227	197½	178
February 14th to February 21st	7	83	66	61
February 21st to March 31st	28	287	222	236½
March 31st to April 18th	28	352	268½	261
April 18th to May 16th	28	456	221	331
May 16th to May 31st	15	244	126	200
Total	134	1,649	1,101	1,267½

The animals in group I. kept good health throughout, while those in group II. were not so thrifty. B animal of this group became so stiffened by April 25th that it had to receive a change of diet, of a much lighter character. Animals C and B of the third group became slightly stiffened in limbs during the last two weeks of the experiment.

TABLE No. XLIII shows the weight of each animal at different periods throughout the experiment.

Dates of weighings.	Number of days.	Group I.				Group II.				Group III.			
		A.	B.	C.	D.	A.	B.	C.	D.	A.	B.	C.	D.
1890.		lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lbs.	lb.	lb.	lb.
January 17th....	....	69½	47	67½	47	69½	51½	51½	36	73	62½	51	38
January 24th....	7 days.	72	50	76	50	85	57	56½	40	74	67	52	41
February 14th ..	21 "	87	64	98	66	110	72	69	46	94	85	59	50
February 21st ..	7 "	94	67½	105½	74	118	77	73½	46½	97½	91½	60½	54
March 21st......	28 "	112	83	129	98	138	96	81	55	128	125	82	82
April 18th	28 "	128	101	163	132	167	122	94	77	137	137	85	84
May 16th	28 "	138	118	193	167	183	119	101	88	147	164	92	98
May 31st........	15 "	145	128	210	183½	196	133	106	99	155	161	96	108

NOTE—A, represents thoroughbred sow ; B, grade sow ; C, grade barrow ; D, grade barrow.

TABLE No. XLIV shows the daily averages of the food eaten, and increase live weight of the average animal of each group.

Group.	Amount of meal eaten daily by average animal.	Increased live weight of the average animal.
I..	3.07	1.35
II..	2.27	.49
III..	2.36	.21

On May 31st the pigs in Group I. were sold for 5¼ cents per pound. On July 23rd the thoroughbred sow of Group II. was sold for $25.00, and on September 11th the remaining pigs were sold at rate of 5 cents per pound.

(28) GREEN FODDER AS A FOOD FOR SWINE.

On June 7th, 1890, an experiment was commenced with swine to ascertain the value of green fodder as a help in cheapening the cost of producing pork.

Nine animals were used in the experiment, which were divided into three groups, with three animals in each group. The three lots were very evenly divided as regards age, breeding and class of animals, as may be clearly seen from the following table:

TABLE No. XLV shows the classification and character of the animals used in the experiment.

Group.	Date when experiment commenced.	Date of experiment closing.	Animals per group.	Litters represented in group.	Breeding.	Date of farrowing.	Class of animal.
				1	Berkshire, pure..	Sept. 11	Sow.
I	June 7	Oct. 8	3	2	Berkshire, grade.	Dec. 1	Barrow.
				3	Berkshire, grade.	Nov. 25	Barrow.
				1	Berkshire, pure..	Sept. 11	Barrow.
II	June 7	Oct. 8	3	2	Berkshire, grade.	Dec. 1	Barrow.
				3	Berkshire, grade.	Nov. 25	Sow.
				1	Berkshire, pure..	Sept. 11	Barrow.
III	June 7	Oct. 8	3	2	Berkshire, grade.	Dec. 1	Sow.
				3	Berkshire, grade.	Nov. 25	Barrow

The experiment proper continued from June 7th until October 8th, 1890, being a period of 123 days. The feeding took place three times daily, as follows: 8 a.m., 1 p.m. and 5 p.m. Previous to June 7th the animals of each group received their respective rations, and from this period of preparation an idea of the amount of food which each group would eat up cleanly was ascertained. No. I. group received all the meal they would eat, without waste, while No. 2 group received about three-quarters the amount of meal and in addition a quantity of green fodder, while No. III. group ate about one-third as much meal as No. I. and twice the weight of green fodder consumed by No. II. group. When any change in the quantity of food given took place, it was always made at the end of some one period, each period being two weeks long. The meal in every case was composed of peas 2 parts; barley 1 part; oats 1 part, and wheat middlings 1 part, while the green fodder from one time to another was composed of clover, oats, millet and corn, according to season.

The following table shows the amount of food eaten by each group at periods of fourteen days each throughout the experiment, and also the average eaten per day by each group, and by the average animal of each group.

TABLE No. XLVI shows the amounts of food eaten throughout the experiment.

Date.	Number of days.	Group I.	Group II.		Group III.	
		Meal.	Meal.	Green fodder.	Meal.	Green fodder.
June 7th to June 21st	14	168	126	42	56	112
June 21st to July 5th	14	168	126	70	56	140
July 5th to July 19th	14	168	126	84	56	168
July 19th to August 2nd	14	168	126	84	56	168
August 2nd to August 16th	14	168	126	84	56	168
August 16th to August 30th	14	168	126	84	56	168
August 30th to September 13	14	168	126	84	56	168
September 13th to September 27th	14	168	126	84	56	168
September 27th to October 8th	11	176	132	66	66	132
Total, June 7th to October 8th	123	1520	1140	682	514	1392
Average per day	1	12.36	9.27	5.55	4.18	11.32
Average of each animal per day	1	4.12	3.09	1.85	1.39	3.77

At every fourteen days during the experiment, the animals were weighed separately and the weights of each recorded. The table below besides giving the weights at each period, gives the increase of live weight of each animal, the total increase of each group, and the average increase of the three animals in the separate lots.

TABLE No. XLVII shows the weights of the different animals during the testing.

Date.	Number of days between weighings.	Group I.			Group II.			Group III.		
		Thoroughbred Berkshire.	Grade Berkshire.	Grade Berkshire.	Thoroughbred Berkshire.	Grade Berkshire.	Grade Berkshire.	Thoroughbred Berkshire.	Grade Berkshire.	Grade Berkshire.
June 7th	......	199	115	139	164	104	174	193	103	146
June 21st	14	215	130	152	169	114	186	196	109	148
July 5th	14	228	137	162	176	121	197	195	114	151
July 19th	14	242	145	177	170	133	209	195	116	153
August 2nd	14	250	159	185	189	142	225	193	118	158
August 16th	14	269	169	198	186	151	240	195	116	153
August 30th	14	277	184	200	199	165	253	195	129	160
September 13th	14	280	190	204	194	170	260	200	131	170
September 27th	14	296	196	219	200	175	263	196	128	165
October 8th	11	304	207	234	207	183	274	200	130	171
Increase of each animal	123	105	92	95	43	79	100	7	27	25
Increase of each group	123	292			222			59		
Increase of average animal of each group	123	97.3			74			19.7		

On October 8th, the experiment proper was closed. The pigs in No. I. group were fat and looking well, those in No. II. were also about prime; but not as fat as those of No. I. group, while those of lot III. were not nearly prime; but were what may be classed as good store pigs;

The thoroughbred Berkshire of group I. was sold on October 7th, for breeding purposes, and brought $25. The other eight were fed until November 17th, when they were sold for $4\frac{1}{10}$ cents per pound, live weight.

(29.) SOILING COWS.

After a week of preparation, two cows were entered upon an experiment to determine how much land would be required to produce sufficient food for them during the summer season. The experiment was started on June 10th, and closed September 26th, making in all 108 days. No special preparation was made to grow the largest yields of produce upon the land, but fodder was cut from the ordinary farm fields near the barns, and the area of the patches used was carefully measured and recorded. The fodder consisted of, permanent pasture, clover (first growth), lucerne, peas and oats and clover (second growth), and was fed in the order named. The cows were kept in the main stable where they had comfortable quarters, both standing in a double stall. The cows had been some time in milk, and one calved soon after the experiment closed, and in consequence of this the only results that will be here considered is the area of land required to keep the two cows for 108 days upon green fodder.

TABLE NO. XLVIII shows the areas of ground from which the fodder was taken.

Growths.	Crops.	Area of each crop.	Area of first and second growth.	Total area.
		acre.	acre.	
First growth	Permanent pasture	.3275	.7952	1.559
	Red clover	.2322		
	Lucerne	.0500		
	Peas and oats	.1855		
Second growth	Lucerne	.0500	.7638	
	Red clover	.7138		

This shows an area of 1.559 acres required to produce sufficient food for two animals from June 10th to September 26th, or for one animal it would require .78 acre.

(30) FEEDING OF STEERS OF DIFFERENT BREEDS.

During the past year an experiment has been commenced to test the comparative merits for beef production, early maturity, etc. of the grades of the principal breeds of cattle in Ontario. It is expected to continue this experiment for a number of years by using three sets of animals with from one to two years intervening between the commencement of the different sets. Each set will be continued for two and a-half or three years, and careful records kept throughout the entire time.

In the early part of this year grade calves of the Galloway, Shorthorn, Aberdeen Angus Poll, Hereford, Devon, and Holstein breeds were procured from different breeders over Ontario. A representative of what is called the "Native" or "Scrub" type was obtained from Quebec, to have in the comparative test with the grades. A second grade short-horn animal was entered in the contest and was given skimmed instead of new milk for the first six months.

The animals were all received at the O. E. farm when under fifteen days old except the Galloway which was fifty-three days old when arriving for the experiment, but previous to this time he had been running with the dam.

TABLE No. XLIX shows particulars regarding eight grade calves which were entered upon experiment.

Grade.	Source of obtaining animal.	Sire.	Dam as described by the owners.	Date at which each animal arrived at Ontario Experimental Farm.	Age in days of each animal when arriving at Ont. Expt. Farm.
Galloway	Mr. Keough, Owen Sound, Ont.	Rajah of Brooke (3970)	A light roan, $\frac{1}{8}$ short horn and $\frac{7}{8}$ Canadian	1889. December 26th	53
Short Horn	Mr. Ballantyne, Stratford, Ont.	Methlick Hero=2723=(imp.)	A high grade short horn	1890. January 11th	14
Aberdeen A. Poll.	Messrs. Hay and Patton, New Lowell, Ontario	Runnyme 2nd, 5220	A common Canadian two-year old heifer	" 9th	8
Hereford	Mr. J. O. Clifford, Oshawa, Ont.	King Hal, owned by Mr. Drew	A good common cow	" 9th	4
Devon	Mr. Robertson, Eden Mills, Ont.	Bull, owned by Mr. Rudd	A short horn grade	" 14th	6
Holtstein	Mr. A. C. Hallman, New Dundee, Ontario	African Prince (H. F. H. B.) 1270	A common cow	February 22nd	5
Short Horn (fed on skim milk)	Ontario Experimental Farm, Guelph, Ontario	Macduff	A short horn grade	April 1st	0
Scrub	Quebec	A native bull of the rangey type	A three-year old native	April 23rd	7

The following shows the character of food used in the experiment up to the end of the first nine months:

Milk { Whole, with a very little skimmed which was reckoned as equal to one-half the quantity of whole milk.

Hay { Timothy, about one-half.
Clover, about one-half.

Meal	Peas,	one-fourth	by weight.
	Oats,	"	"
	Bran,	"	"
	Small wheat,	"	"

Green Fodder { Clover,
Peas and oats.

The milk was fed from the pail until each animal was six months old after which time the milk was withheld. The hay was of medium quality, and was cut finely before being fed. Each animal received all the hay he would eat without waste. The meal consisted of the above mentioned grains ground together, and was fed dry until green fodder was given, at which time it was mixed with the fodder. The green fodder was cut up and fed in quantities that would be eaten up cleanly, and was fed after being mixed with the meal.

TABLE No. I shows some notes taken on the grade steers at the end of the first six months after birth of each.

Breeding.	Color of animal.	Build of animal.	Flesh.	Handling qualities.	General appetite.
Galloway grade......	Black with very little white.	Short in the leg and blocky.	Inclined to deep and even flesh.	Good	Good.
Shorthorn "	Solid red............	Slightly leggy for S. H. type.	Fleshed well....	"	Medium.
Aberdeen A. Poll grade	Solid black..........	Not robustly developed.	"	Medium to good.	Poor to medium.
Hereford grade......	Typical Hereford color.	Short in legs and heavy in body.	"	Good	Good.
Devon "	Red with white spot on shoulder.	Neat, squarely built frame.	"	"	"
Holstein "	Typical Holstein in color.	Large, with a tendency to coarseness of bone.	Below average in fleshiness.	"	"
Shorthorn " (fed on skim milk).	Red and white..	Large but well built.	Medium flesh. ..	"	"
Native or scrub.......	Light red...........	Narrow in body, flat ribbed and long in legs.	Poorly fleshed..	"	Poor.

Table No. li shows the amount of food eaten for the first six months of the test by the animals under experiment.

Animals.	Date of birth	Food eaten by each animal in first three months. lb.			Food eaten by each animal in second three months. lb.				Food eaten by each animal for whole milk period (six months). lb.			
		Milk.*	Hay.	Meal.	Milk.	Hay.	Meal.	Green fodder.	Milk.	Hay.	Meal.	Green fodder.
Galloway grade	Nov. 3, 1889....	770.9	8	36½	755.0	207½	245	20	1525.9	215.5	281.5	20
Shorthorn "	Dec. 28, "	1888.8	3	5	2494.8	104	191½	68	4383.6	107.0	196.5	68
Aberdeen A. Poll grade...	Jan. 1, 1890....	1637.0	8	17	2545.2	105	178½	57	4182.2	113.0	195.5	57
Hereford grade.	" 5, "	1745.5	12½	24½	2408.4	127½	219	66	4154.0	140.0	243.5	66
Devon "	" 8, "	1387.5	8	6½	2224.0	104	128	70½	3611.4	112.0	134.5	70.5
Holstein "	Feb. 17, "	2057.8	9	12	2418.0	101	178½	125½	4475.5	110.0	190.5	125.5
Shorthorn grade (fed on skim milk).............	Apr. 1, "	2018.5	4½	3½	2673.0	171	184½	212	4691.5	175.5	188.0	212.0
Native	" 16, "	1387.7	1½	1½	2374.0	70	92	148	3761.7	71.5	92.5	148.0

* Quantity of milk taken before each animal reached the farm was estimated by allowing the same daily amount during that period as during the other portion of the first three months.

TABLE No. LII shows the weights of each animal taken when six months old.

Animals.	Weight of each animal when six months old. lb.
Galloway grade	457
Shorthorn "	530
Aberdeen A. Poll grade	485
Hereford grade	545
Devon "	434
Holstein "	537
Shorthorn grade (fed on skim milk)	454
Scrub	386

(31) STABLE CONFINEMENT IN REARING CATTLE.

To get some actual results from the practice of rearing cattle without exercise an experiment was conducted during the last summer with an Ayrshire grade heifer, in which test the animal was confined in a box-stall from the time it was four days old until it reached the age of 194 days, at which time it became stiffened in the limbs so badly it had to be removed.

The animal used was from a pure bred Ayrshire bull and a grade Shorthorn cow, and was calved on May 20th, 1890. The box-stall in which the animal was kept was in the central part of the large stock stable under the main barn, and was 11 ft. 6 in. long by 8 ft. 4 in. wide. The wall was tightly boarded, 5 ft. high on all sides, above which there was an entire opening to the main stable.

For the first two weeks of the experiment the calf got all whole milk, for the second two weeks a mixture of whole and skimmed milk in equal quantity, after which time the milk given was all skimmed. When the animal was five months old the milk was stopped, and the meal, hay and roots was continued.

TABLE No. LIII shows the amount of food eaten during the confinement in the box-stall.

Food.	Quantity eaten (pounds).
Milk	2411
Meal (mixture)	473
Hay (timothy and clover)	195½
Roots (mangels)	538
Green Fodder (corn and millet)	103½

The following is the weight of the animal at different periods :—

May 20th	28 pounds.	August 20th	236 pounds.
June 20th	130 "	October 20th	390 "
July 20th	184 "	November 20th	455 "

During the experiment up to the latter part of November the heifer had a good appetite and was in good health, but at that time she began to get weak in the limbs, and by November 30th she was stiff on all limbs and unable to stand without great difficulty. On December 1st she was taken out of the stall and left in the yard a little while, and by means of some exercise each day a marked improvement was soon seen, and by December 5th she was able to run while in the yard. In two week's time of stall tying and daily exercise she gave appearance of again possessing good health and having full use of her legs.

(32) BERKSHIRE VERSUS IMPROVED YORKSHIRE.

It is unsafe to draw conclusions from experiments in breed competition until a sufficient number has been conducted to overcome, to a large extent, the individual peculiarities of animals. It is with the hope that an opportunity may be afforded for several tests between the pure bred Berkshire and the pure bred Improved Yorkshire breeds of pigs that one has been conducted along that line during the past autumn. One animal of each breed was selected, as a larger number could not at that time be procured.

The Berkshire was a pure bred male animal and was farrowed on June 18 in a litter of nine. He was third or fourth best animal in the litter.

The Improved Yorkshire was also a pure bred male animal and was farrowed on July 4 in a litter of nine also, and was taken from the sow just at the time the experiment was commenced.

The experiment began on August 19th and continued until December 19th. Each animal had good health throughout with the exception that the Improved Yorkshire was slightly troubled with rheumatism for a while towards the end of the test but had recovered before the close.

TABLE No. LIV shows the amount of food given to each animal during the experiment.

Months.	Berkshire		Improved Yorkshire.	
	Milk.	Meal.	Milk.	Meal.
1 (Aug. 19–Sept. 19	99 lb.	19½ lb.	99 lb.	19½ lb.
2 (Sept. 19–Oct. 19)	120 "	67 "	120 "	62 "
3 (Oct. 19–Nov. 19)	4 "	135 "	4 "	120 "
4 (Nov. 19–Dec. 19)	Roots. 29 lb.	110 "	Roots. 29 lb.	100 "

From this we see the amount of food consumed by each animal was as follows:

	Milk. lb.	Meal. lb.	Roots. lb.
Berkshire	223	331½	29
Improved Yorkshire	223	301½	29

TABLE No. LV shows the weights of the animals at different periods.

Dates of weighing.	Berkshire.	Improved Yorkshire.
August 19th	25 lb.	25½ lb.
September 19th	61 "	60 "
October 19th	104½ "	102 "
November 19th	140 "	134½ "
December 19th	167½ "	155 "

The Berkshire throughout the test ate thirty lb. more meal than the Improved Yorkshire and made an increase of twelve and one-half lb. over the latter. The animals are now being used for breeding purposes.

CONCLUSION.

In conclusion I wish to speak of the grain exhibit which, by your direction, I placed at the Midland Fair, Kingston ; Industrial Exhibition, Toronto ; Western Fair, London ; and Walkerton Fair, held at Walkerton during the autumn of 1890.

This exhibit contained 328 varieties of cereal grains, of which 56 were fall wheats, 64 were barleys, 85 spring wheats, 95 oats and 28 peas. Nearly all of these were shown in the ear, and they represent the growth of the first and second years since importation, viz., the years 1889 and 1890, but they included 30 new varieties of imported winter wheats and some other kinds of grains obtained from New Zealand, tried for the first time on the farm.

Grain was shown in sample jars representing the seed as imported from various countries in Europe, Asia, Africa, New Zealand and Australia. Of these grains there were 237 varieties. There were also 66 samples of corn, all of which have been tested upon the farm by the Dairy Department, and a large number of varieties of other kinds of grain grown during 1890, in so far as they could be got ready in time for exhibition.

The facilities for experimental work have been considerably increased during the past year in the purchasing of a small separator and tread power for the experimental threshing, and also the large scales for weighing the produce from each plot. There are two features which I wish to speak about as being of the utmost importance to the real practical bearing and greater development of the experimental work at this institution for the best interests of the farmers of Ontario.

(1) That an experiment station building be erected upon the college grounds where work could be accomplished during the winter months in preparing grains and fertilisers for the coming season's experimental work and for distributing over the province ; where samples of all the different varieties could be collected for close examination by ourselves and for inspection by others ; and where the reports could all be prepared with the different products close to hand for reference, etc.

(2) That there be a number of branch experiment stations established throughout Ontario. In a province with such a variation in both soil and climate as is possessed by Ontario, it is quite evident that tests carried on at the station at Guelph with fertilisers, imported grains, varieties of fruit, etc., etc., cannot form close guides for the farmers in very many localities. These branch stations, with the station at Guelph as their centre, need not be very elaborate or expensive, and would form centers for experimental work in the different localities.

I would ask that you do your utmost in presenting to the Government of Ontario the advantages of these two may I say real necessities, as I am of the firm opinion that the results accruing therefrom would be of inestimable value to the farmers of Ontario.

Respectfully submitted,

C. A. ZAVITZ.

Assistant Director.

PART VIII.

REPORT OF

ASSISTANT IN DAIRY DEPARTMENT.

ONTARIO AGRICULTURAL COLLEGE,
GUELPH, ONT., December 31st, 1890.

To the President of the Ontario Agricultural College:

SIR,—I have the honor to present herewith my report upon the work done during the year 1890, in the Dairy Department. It will be most convenient to consider it under the following divisions:

1. Creamery management.
2. Feeding experiments with hogs.
3. Fodder corn and the silo.
4. Winter dairying.

1.—CREAMERY MANAGEMENT.

For parts of seven seasons the Ontario Creamery has now been in operation. Its success has been varied. The season determines to a large extent the measure of success; that of 1889 was a very dry one, the supply of cream fell away so much it was deemed advisable to close the factory the middle of August, while that of 1890 was a more favorable one in many respects. The continued wet weather in the spring and early summer, while damaging to the corn field, was beneficial to the pastures by starting a luxuriant growth which, aided by the summer showers, kept fresh much longer than usual. During September, however, the pastures were not so good and the cream fell away so much that two routes had to be gathered only twice a week instead of four times to keep down expenses.

Before commencing operations for the season the appearance of the inside of the creamery was much improved by a coat of paint. The churns, vats and other furniture were put in good shape and painted. The engine was taken to pieces, overhauled and put in good working order. The next thing to receive attention was the cold storage room. This is a necessary adjunct to a creamery and especially so where the butter remains in store until the fall. It is then imperative to have a cool, dry room of uniform temperature in which to keep the butter; if these conditions are not obtained a serious loss in the quality of the butter is the result. The cold storage room, when first built, was cooled by a current of cold air entering near the floor from a passage which ran along the bottom and up the side of the adjoining ice-house; an opening in the ceiling giving vent to the warm air. This was found to be insufficient to keep the temperature as was desired. Accordingly, a shelf arrangement of galvanized iron was made at one side of the room to hold ice. In this way the room was cooled very successfully, but the drip from the melting ice kept the floor wet, and the dampness caused the tubs to mould on the outside. The floor settled making a place for the water to gather. Such was the state of affairs when work was started on it this spring. The shelf arrangement and ceiling were taken out, the floor levelled with cement and a new floor put in. It was proposed to put in a galvanized iron ceiling, resting on and dipping in between joists, with room above to put in ice. It was effected in this way:—joists 3 x 12 were set in place on rests securely spiked along the sides of the room; the rest on one side was an inch lower than the one on the other side, this gave a fall on the joists to one side. Over the joists was now placed the galvanized iron in the form of troughs between the joists. The object of having them in this form was to give more cooling surface below. They were about ten inches deep, closed at both ends, but there was an opening in the bottom of the trough at the lower end; this opening was to let the water formed from the melting ice escape, and opened into a flat trough underneath at right angles and connected with the main drain from the building. All the troughs opened at their lower end into this flat one. The iron was securely nailed down to the joists and to the sides of the building; all the joints were then soldered and everything made tight so that there would be no leakage. Slats were placed on top to prevent the blocks of ice injuring the iron. As the air in the storage room came in contact with the cool surface of iron it would be chilled, then sink and warmer air take its place. In this way the temperature would be kept down. As the warm air came in contact with the cold surface the moisture in it would be deposited on the iron, to prevent this dripping on the floor small troughs were swung close under the large ones to catch it and empty it into the cross-trough at the end. Thus the room was kept dry and cool; no difficulty was met with in keeping the temperature at about 50° Fahr. the whole season. The saving in ice over the old way of cooling was considerable, to say nothing about the convenience of the new plan, as a door was cut into the ice-house from the chamber above the storage room, and about fifteen blocks of ice put in once a week would give us the temperature required without any further trouble.

Early in the spring a few weeks were spent in visiting the former patrons and others in the interests of the creamery. A public meeting was then called in the city at which the report of last year was read and an outline of the proposed work, etc., for the present year presented, and a committee of management were appointed to look after the creamery in the interest of the patrons.

The cream only was gathered, the skim milk being left for use on the farms. The patrons used what is known as the shot-gun pail, a narrow pail about twenty inches deep, the patrons doing their own skimming. The gatherers carried a pail 12 inches in diameter in which all the cream was measured by a steel rule. An inch deep in this pail makes what is called a creamery inch. Credit was given each patron for the inches and eighths inches of cream he had. The cream was gathered three times a week from each patron, each gatherer having two roads, going on the same road alternate days. A sample of each patron's cream was taken every time the gatherer obtained cream from him, this was put in a numbered tube, the number marked in the gatherer's book opposite the patron's name, and the tube taken to the factory. At the factory the tubes brought in that day were warmed if necessary and allowed to stand to sour until the following morning, when they were churned in an oil test churn. In this way the churnable fat or butter-making value of each sample was determined. The variation in the quality of the different samples of cream was from nine ounces to twenty ounces of butter per inch of cream. We have thus been able to distribute the proceeds of butter sales among the patrons according to quantity and quality of the cream furnished.

The creamery has been used to a certain extent for instruction of students in the practice of butter making. We had a young man with us the most of the summer learning to make butter besides a number of students who spent from a day or two to two weeks in the factory.

The college creamery does not afford its patrons any special advantages over what may be realised from any joint stock or private concern in any part of the province.

Those who furnish cream are paid for it at the price realised from sales of the butter manufactured, after all expenses for cream gathering, management, labor, furnishings, tubs, fuel, ice, salt, etc., etc., have been deducted. Strict economy is practised and all outlays and expenses kept as low as possible. Notwithstanding this, the cost of making per pound of butter is high. The cost of gathering the cream depends so much on the distance to be travelled for the quantity collected that the number of patrons and cows within a given area largely determines the rate per pound. For the ground covered, the number of patrons and the quantity of cream supplied is unnecessarily small. This may be accounted for to some extent by reason of the area required for supplying milk to the city of Guelph and the important thoroughbred stock interests of the country around Guelph have prevented a large number of the best farmers in the vicinity from sparing any cream for butter-making. Hence our patronage is almost wholly from farmers living from two to nine miles from the college. Another difficulty we have to contend with arises in this way. The butter market of Guelph is a good one and the withdrawal of so much butter from the market as effected by the creamery improves it for those who do not patronise the creamery; consequently, our patrons are tempted after July by the increased price to make up and market their own butter direct. The committee deemed it advisable to make an effort to prevent patrons quitting the creamery before it was closed down for the season.

The following circular was sent to every patron (only one refused to sign it) and to their credit be it said we did not have to enforce it. One or two did quit before the season was over, yet it was because they did not have any cream to spare beyond what they required for their own use.

Notice to Patrons.

The committee appointed by the patrons, and made responsible for the management of the Ontario Creamery for the present season, has decided to pay on account 16 cents per pound of butter from the beginning; but, as this price is more than the market warrants in the early part of the season, this payment of 16 cents per pound, is made to each patron with the understanding that he will continue to send his cream to the creamery till the end of the season, and that in case he fails to do so, for any reason which is not satisfactory to the committee, he shall forfeit 10 days cream and his share in any surplus which may be at the end of the season.

Further, the patrons are requested to see that the gatherers in every case stir the cream thoroughly, and take the exact full of the small dipper as a sample for testing; and if any patron observes anything that he disapproves of, or in case he is dissatisfied for any reason whatever, he will oblige by at once making the matter known to some member of the undersigned committee.

We may simply add that every effort will be made to manage the creamery in such a way as will be satisfactory to the patrons.

(Signed),
Duncan Macfarlane, Aberfoyle,
Duncan Gilchrist, Arkell,
Jas. Lennie, Guelph,
Alex. McIntosh, Mosboro',
John Crosby, Marden.

Ontario Agricultural College,
Guelph, May 15th, 1890.

N. B.—Patrons are particularly requested—

1. To see that the udders of their cows are brushed, or rubbed with a damp cloth before milking.

2. To see that the cows are not milked in stables or other places where there are any strong or offensive smells.

3. To see that the milk is not at any time allowed to stand where there are bad smells, but is carefully strained into thoroughly scoured and well aired cans as quickly as possible after it is drawn from the cows.

4. To see that the cans receiving the milk are promptly placed in the coldest water that can be got, and that the water be changed twice in case no ice is used. Otherwise, some of the cream will be left in the milk.

The agreement between the committee and the patrons at the beginning of the season was to the effect that they should receive after the end of each month a cash advance on the cream supplied, at the rate of 16 cents, per pound of butter made. After providing for these prices, and paying all expenses out of receipts from the sale of butter and buttermilk, there is a balance of $207.35 on hand for distribution among them.

A summary of the season's business is herewith presented—

Receipts.	$ c.	Disbursements.	$ c.
Sales of butter	5,908 75	Patrons for cream	4,479 26
Sales of buttermilk	216 44	Labor.....................................	294 57
		Cream gathering	654 00
		Salt, tubs, fuel, ice, repairs, sundries, etc.	490 01
		Balance on hand.........................	207 35
	6,125 19		6,125 19

Butter manufactured....................................	29,252	pounds
Average price per pound of butter	20.20	cents
Number of patrons	85	
Number of days in operation............................	110	
Routes travelled by cream waggons	4	

Length of routes ranged from 18 to 25 miles.

Cost of cream gathering ..	2.24			cents	per pound	of butter.
Cost of labor	1.01			“	“	“
Cost of furnishings.......	1.67			“	“	“
Total	——	4.92		“	“	“
Cr. Receipts from sales of buttermilk............		.74		“	“	“
Net cost for collecting cream and manufacturing.....		——	4.18	“	“	“

The cost per pound is still much higher than it should be, although every reasonable effort was made to reduce the rate. It is very high when compared with that of many of our leading creameries. Salt of Canadian manufacture was used at the rate of about an ounce to the pound of butter, and the butter packed in tin lined tubs.

2.—FEEDING EXPERIMENTS WITH HOGS.

The progres of ideas as connected with farm practices is far more rapid than farmers get credit for as the work goes along We have only to look back over a few years of time to learn that great changes in methods and practices have taken place, and have settled down into the position of common practice. This change has been very marked in some lines of farm practices; but none more so than in the business of growing and fattening pork. It is more plainly illustrated in the west with their larger operations, though the change has taken place here as well as there. It was but a few years ago that it was the general understanding, that a hog must be a year old or more before he was ready to be fitted for the butcher or consumer, that heavy weights with a lot of fat must be obtained. The demand for that kind of meat has passed; a lighter hog with more lean meat, long sides and good quarters is wanted.

It has been shown that a pound of growth could be made on less food, and at far less cost on a growing beefing animal than on an old one, that, in fact, it was a law of growth that the younger the animal, the greater the growth per day, and the less food called for per day. This is just as true of a hog as of a cattle beast, and growers were not slow to take advantage of it, for, in feeding as in all other lines of farming, the factor of profit holds the leading position and all progress is rightfully following its lead.

The growing of pork is rapidly on the increase in Ontario; this is as it should be for there is money in making pork of the proper quality. We have no animal that makes so good a use of the food fed it as the despised grunter. They digest a larger percentage of their food than any other animal; they also require less food to support life, respond most readily to good treatment and in every way are the most profitable, when rightly managed, of our farm stock. Although great changes have taken place in the growing and fattening of our hogs—there is another change that should be made, that is, in the time of marketing. Hitherto, the general time of marketing has been late in the fall or early winter. A study of the prices for pork during the last few years reveals the fact that the highest prices are paid for pork during the summer months, the highest price generally being given in August, for pork of the right quality. Our farmers should endeavor to supply the demand during these months when our packers buy largely of American pork. Canadian fed hogs bring higher prices than the American ones, because they make better pork. The demand for them is always so brisk during the summer months that sales are easily effected at good prices. As we fatten hogs for profit, or if we don't we should, this is a matter we should take into consideration, it is the little gains like this that make up the sum of our yearly profits, they are, therefore, worthy our most earnest attention. As young pigs cannot be made to attain the most profitable weights under six months, it would not be easy for many of our farmers to furnish pigs for the early part of the season; but those farmers who have warm pens could do it from late autumn litters, and many of them could obtain much higher prices for their pork than they do at present, if they would have litters in February and March. They could then get their pork on the market before the market becomes glutted in the fall.

EXPERIMENTS IN FEEDING.

Every animal requires a certain amount of food to sustain life, this may be called the food of support, or a maintenance ration. It goes to produce heat, repair waste tissue, and to do the necessary functional work of the body, it is to keep the animal from losing flesh, at the same time it is not so great as to cause any increase in weight. Any gain in weight an animal makes comes from food over and above that required to sustain life, hence we see why liberal feeding always pays. This maintenance ration increases as an animal increases in weight; we have thus to feed heavier as the animal grows older, to get a corresponding gain. During the past season experiments in feeding hogs were carried on to ascertain, if possible, the increased rate or amount of food required as the animals grew and were carried to heavy weights.

The following conditions, etc., apply to all the pig experiments recorded. The building was of stone, cool in summer and warm in winter, fairly well ventilated, windows darkened in the hot weather to keep out flies, for pigs like comfort and peace. A small yard at the rear of each pen gave an opportunity for fresh air and exercise. Feeding was done three times a day, regularly. The feed in all cases mixed in the trough, with water or milk as the case might be, immediately before the pigs had access to it; they had a liberal supply of salt; all feed was weighed; once a week the pigs were weighed and a record kept of each.

I. *Pens Nos. 1 and 2.*—In August last year eight pigs of the same litter, a Yorkshire cross, were divided as evenly as possible into two pens of four each. The object being to feed them on middlings, salt and water, to find the increase of food required to put on a pound of flesh as they gained in weight. The pigs weighed about 40 lb. each on an average when they entered on the experiment. Both pens continued until the pigs weighed an average of about 140 lb. each. Pen No. 1, was then put on the rape ensilage for six weeks, when this was done they were continued on middlings until the close of the experiment, a suitable allowance of time was made for change of feed. Pen No. 2 was fed middlings continuously and both pens were carried on until they had attained an average weight of nearly 300 lb.

The following table shows the weight of each pen at the beginning and end of the different periods into which it has been divided. It also shows the gain made, feed consumed, the amount required to make a pound of flesh, and percentages of increase.

Table i.

Pen Nos. 1 and 2.

Increasing in weight from	No. of pen.	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Middlings consumed.	Middlings consumed per pound of increase.	Average of pens 1 and 2.	Increased percentage of food required per pound of gain.
40 to 95 lb ..	1	158 lb ..	385 lb ..	227 lb ..	436 lb	1.92 lb ..	2.095 lbs	
	2	170 " ..	360 " ..	190 " ..	433 "	2.27 " ..		
95 to 140 lb ..	1	385 " ..	545 " ..	160 " ..	521 "	3.25 " ..	3.255 "	55.37
	2	360 " ..	520 " ..	160 " ..	522 "	3.26 " ..		
140 to 175 lb ..	1	555 " ..	685 " ..	130 " ..	Middlings, 211 lbs .... Rape, 2,018 lbs ..	Middlings, 1.62 lbs .. Bape, 15.53 " ..	4.73 "	45.31
	2	520 " ..	701 " ..	181 " ..	1,856 " ..	4.73 " ..		
175 to 250 lb ..	1	708 " ..	972 " ..	264 " ..	1,153 " ..	4.36 " ..	4.16 "	
	2	701 " ..	990 " ..	289 " ..	1,146 " ..	3.96 " ..		
250 to 300 lb ..	1	972 " ..	1,163 " ..	191 " ..	775 " ..	4.05 " ..	3.90 "	
	2	990 " ..	1,190 " ..	200 " ..	750 " ..	3.75 " ..		

The rape saved very well in the silo coming out nice and fresh, the pigs took to it readily and did very well on it. According to this experiment 5 lb. of rape ensilage was equal to 1 lb. of middlings in producing a pound of gain in live weight. In another experiment carried on at the same time, and given in last year's report, page 187, it took 5.12 lb. of the rape ensilage to equal one pound of the middlings. The value of rape as a food for hogs should not be overlooked in these days of rape growing.

In looking over these results we see a steady increase in the amount of food required to put on a pound of flesh as the pigs grow older and heavier ; after they had attained a weight of two hundred pounds it decreased somewhat. We find a similar increase and decrease in the other experiments, in the food required for a pound of flesh. We also notice that the most feed was required to put on a pound of flesh when the pigs were making a gain from 150 lb. to 200 lb. The feed required to increase the weight of the pigs one pound, from 95 to 140 lb. was on an average 55.37 per cent. greater than that from 40 to 95 ; and from 140 to 175 lb. 45.31 per cent greater than from 95 to 140 lb., also, that it required 90.45 per cent. more feed to put on one pound of the second hundred than the first hundred pounds. The food required for increasing the live weight above 200 lbs. is not so great, yet much greater than for weights nearer the 100 lbs. Heavy weights and a great amount of fat are not wanted.

In the month of April 19 hogs were purchased and divided into three lots as equally as possible, so as to have three pens well balanced for experimental work. A different kind of food was fed each pen and notes on their respective gains made.

II. *Pen No. 3.—Feed, Middlings.*—A few weeks preparatory feeding was given them. They got about as much skim milk and buttermilk to drink as if water had been given them, this was discontinued at the end of the first feeding period. and from that until the close of the experiment they got water only to drink. For the sake of seeing more plainly the rate of increase in the feed the feeding period has been divided into four parts. The weights come as near the even numbers as it is possible to get them.

TABLE II.

Pen 3—Six Hogs..

Increasing in weight from	Weights at beginning of feeding period.	Weights at end of feeding period.	Gain.	Middlings consumed.	Middlings consumed per pound of in crease.	Increased percentage of food required per pound gain.
50 lb. to 78 lb.	328 lb	468 lb	140 lb.	315 lb	2.25 lb	
78 " to 105 "	468 "	629 "	161 "	573 "	3.36 "	49.33
105 " to 153 "	629 "	930 "	291 "	1,643 "	5.64 "	67.85
153 " to 197 "	920 "	1,180 "	260 "	1,161 "	4.46 "	

The amount of food required to make the gain of one pound from 78 lb. to 105 lb. was 49.33 per cent. greater than that required in making the same gain from 50 lb. to 78 lb. while the increase in the amount of food required to make the gain of one pound from 105 lbs. to 153 lb. over that from 78 lb. to 105 lb. was 67.85 per cent., or 150.66 per cent. more than from 50 lb. to 78 lb. To make the gain of one pound from 105 lbs. to 153 lbs. required 101.4 per cent. more feed than that required to make the same gain below 105 lbs.

In increasing from 50 lb. to 105 lb. it required on an average 2.805 lbs. of middlings to put on a pound gain of live weight, while the average from 50 lbs. to 197 lb. was 4.33 lbs. to put on a pound gain.

III. *Pen No. 4, Five Pigs.—Feed, Bran.*—After a short preparatory feeding on middlings and milk, they were put on bran, as much as they would eat, with what skim milk and buttermilk they would drink, the milk was continued through the experiment, towards the close however it diminished somewhat.

The object of this experiment was to show the value of bran as a feed for hogs, where there was a liberal supply of skim milk. Hitherto bran has not been considered a very suitable food for pigs.

TABLE III.

Pen 4—Five Hogs.

Increasing in weight from	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Weight of bran consumed.	Amount of bran per pound of gain.	Increased percentage of food required per period of gain.
50 lb. to 74 lb	250 lb	371 lb	121 lb.	322 lb	2.66 lb	
74 “ to 103 “	371 “	517 “	146 “	424 “	2.90 “	9.02
103 “ to 147 “	517 “	734 “	217 “	809 “	3.72 “	28.27
147 “ to 162 “	734 “	808 “	64 “	392 “	6.12 “	64.51
50 “ to 147 “	Average				3.21 “	

The pigs were not continued long on the fourth period, as it was plainly seen they had got about as far as it was profitable to feed the bran. They were a thrifty looking lot of pigs and grew heavier frames than their mates of the same litter that were fed on middlings and pea meal; they were not fat but had a good covering of flesh, two weeks fattening on corn meal made them ready for market. The gain on the corn meal was very rapid it required 3.22 lb. of meal to put on a pound of flesh.

This one experiment goes to show, that bran is a good food for pigs, in conjunction with a supply of milk, that they can be carried to a weight of over one hundred pounds very cheaply. They would require to be finished off on some other food. The hog grown this way will be more nearly what the packers want than the one grown on richer food, and kept fat from the start.

IV. *Pen No. 5, Eight Pigs.—Feed, Pea Meal.*—These pigs did not have much preparatory feeding, but were put on the pea meal a week or so after they were weaned; they had all the pea meal they could eat, and all the milk they cared for until the end of the second feeding period, when they weighed about 78 pounds apiece, after that they got no more, only water to drink. Though they had all they could eat, there was not one of them went off their feed or feet.

TABLE IV.

Pen 5—Eight Hogs.

Increasing in weight from	Weight at beginning of feeding period.	Weight at end of feeding period.	Gain.	Pea meal consumed.	Pea meal consumed per pound gain.	Increased percentage of food required per pound gain.
34 lb. to 50 lb	272 lb	406 lb	134 lb.	202 lb	1.50 lb	
50 “ to 78 “	406 “	625 “	219 “	396 “	1.80 “	20.00
78 “ to 115 “	625 “	925 “	300 “	969 “	3.23 “	79.41
115 “ to 149 “	925 “	1,195 “	270 “	907 “	3.36 “	4.00
149 “ to 194 “	1,195 “	1,556 “	361 “	1,613 “	4.46 “	32.73
194 “ to 230 “	1,556 “	1,840 “	284 “	971 “	3.42 “	
34 “ to 230 “	Average				3.23 “	
34 “ to 115 “	“				2.18 “	
115 “ to 230 “	“				3.74 “	71.55

The rapid increase in the amount of feed required to put on one pound of gain in the third feeding period may be accounted for to some extent by the supply of milk being discontinued at the end of the second feeding period. It required 71.55 per cent more feed to put on one pound gain between 115 lb. and 230 lb. than it did from 34 lb. up to 115 lb.

In all these experiments we notice a steady increase, as the animals get older and heavier, of the amount of food required to lay on one pound of flesh. This appears to be greatest, in most cases about the time they attain a weight of two hundred pounds, after that it diminishes somewhat. Young pigs are the cheapest to feed and should be turned off about the time they attain a weight of one hundred and fifty pounds, live weight, as the least amount of food as a rule will then be required to produce a pound of flesh.

3.—FODDER CORN AND THE SILO.

The system of providing feed by means of the silo has been in practical operation in Ontario for a number of years, and is reaching an age which should enable it to speak for itself. Nearly every farming section of the Province now has one or more silos in it or near it; this makes it possible for those who have not decided to build one, but are considering it, to become thoroughly acquainted with its workings before they undertake to build one for themselves. They are, therefore, not called upon to exercise the same amount of faith in this new departure in feeding that was required of those who built the first ones and had to follow the directions blindly.

Many of those who have tried them have not been as sucessful as they would like, but they do not lay the cause of failure to the silo, rather to some mistake of their own, either in faulty construction or improper methods of harvesting and filling that could be easily remedied the next time the silo was filled. The objections come mainly from those who have had no experience with them, and have had nothing whatever to do with one. We have yet to hear of a person who has a silo complaining that it was not a success. Experience has taught us how we may avoid many of the objections urged against the silo in its early history, as for instance, that of scouring and giving a bad odor to milk from animals fed on it. These have been largely overcome by taking the corn at a proper stage of maturity and a better manner of feeding it, for it must be remembered that no food when fed alone will give entire satisfaction; ensilage is not a complete food in itself, though it may perhaps come the nearest to it if the corn has been well matured.

Among our most advanced silo advocates the question now is not so much, Does it pay to build a silo? as it is, "How can we perfect the silo?" or "How can we get better results from the silo?" A great deal has been learned about it, but there is a great deal we do not yet understand about it. There is work here for our experimental stations to solve for us.

It is admitted by all intelligent cattle feeders that some succulent food is needed during the winter to keep the animal system in good order, where much dry concentrated food is fed. Such a food we find in ensilage, as it comes the nearest to grass of any food we have to feed during the winter, it is especially valuable in the dairy as a winter food, as its effect on the animal system is such that the butter made from it has much more of the nature of grass butter than that made from dry concentrated feed, The idea that ensilage taints the milk has been exploded. Spoiled ensilage will taint the milk in the same way that any foul food will, but good sweet ensilage will not taint the milk. If the milk has a taint supposed to be from the ensilage, and the ensilage is good, it would be well to look around for some cause for it other than the ensilage. If the milk is allowed to stand around the stable where the ensilage is fed it will soon smell of it; it should be removed from the stable as soon as drawn.

Since silage makes such a good substitute for grass, why not feed it all the year? It requires at present on the large majority of farms from five to six acres to keep one animal the year round. In almost any part of Ontario ten to fifteen tons of corn can be obtained to the acre, ten tons of ensilage will with some grain, feed an animal the year round or in other words we can keep one animal on one acre instead of it requiring five or six to do it. This may be putting it high, but there is nothing to hinder many or all of our farmers doubling the amount of stock which they keep. We are crying about hard times; we look to our legislators to help us, and sit idly by instead of trying to help ourselves. We will not succeed that way, we must help ourselves to success. One way of doing this is by growing more corn, and feeding more animals. It is not necessary we grow all corn, there should be sufficient ensilage to feed until fall sown rye would be ready to cut in the spring, or failing that until clover would be large enough to cut; this might last with another green crop sown in the spring until the new corn crop would be ready to cut. The excess of these crops may be made into hay or put in the silo and fed in the fall if preferred. Rye, clover, oats and peas, etc., can all be saved most successfully in the silo, so that variety can be given the animals the whole time. Soiling is a practice the farmers of Ontario will have to adopt sooner or later to make the most of their land. A simple calculation will convince most men that they can winter an animal cheaper than they can pasture it during the summer. Then why not give up pasturing so much. An acre of grass cut and taken to the animals will feed more than if they had free access to it themselves, as they would lie on it and tramp it down so that a large proportion of it would be wasted, not to say anything about that lost through their droppings falling on it or of the loss of the droppings themselves. The great bugbear about soiling is the amount of work it makes. It certainly means more work but does it not also mean larger returns? Too many farmers try to do a little soiling just to see how it will do, but they find the work so heavy they give it up in despair; why is this? Because they have been trying to do the extra work with the usual amount of help after they have done their day's work; extra work needs extra hands to do it, if they would try it that way they would find that it was a much better way, and the increased returns would soon more than pay for all the extra work, and leave a handsome profit besides.

Growing the corn crop.—The field set apart for growing the corn this year was the one known as No. 12. It consists of about eighteen acres, the newest and at the same time the wettest field on the farm. Only some two or three crops have been taken off it since it was brought under cultivation, hence it was thought that an excellent crop of corn would be obtained without manuring the field. It had been underdrained before it was broken up, but in several low places the drains had not been put down deep enough, for the plow had turned out the tiles; the water did not drain away from these places readily; about four acres of this was not sown with corn, it was too wet and did not get dry enough to work until the end of July.

The field was plowed in the fall and worked up with the disc harrow and spring tooth cultivator in the spring. The open winter before and the heavy spring rains left the ground hard and sad, it required more work to get a good seed bed. In the lower parts of the field the soil was a vegetable mould the rest a clay loam, all the cradle knolls had not been worked down; this proved disastrous for the corn as it was drowned out in the hollows, while that on the knolls did not do as well as it should have done; altogether the field was not a very satisfactory one for experimental work for the season we had, had it been a dry one no doubt a good crop of corn would have been realised.

Planting.—The first of the corn was sown the 28th of May, and it was all sown by the 31st. This was as early as we could do anything with the land; the spring was wet and the land so low. A common force feed seed drill was used for planting; all the spouts but two were closed, by regulating the feed the corn could be dropped at the desired rate. It was nearly all sown in drills three feet apart. Some for experimental purposes was sown at three and a half and four feet apart, different rates of seeding to determine what rate would give best returns, as one grain every six inches, eight inches and twelve inches; the different rates of seeding were continued in drills at different widths. Of the many varieties tried last year only forty-six were deemed of sufficient value to try again this year. These were sown in drills across the field, one row of each kind, three feet apart, and the same number of grains to the foot as evenly as possible.

As part of the field was too wet to plant, land equivalent to that part was obtained in two other places, the ground prepared and sown the 9th of June, wet weather preventing sowing earlier.

After the corn was sown and about ready to come through the ground, the heavy rains flooded the field and much of it was drowned out. Six acres was so badly destroyed that it was ploughed up and sown again June 26th. It came on quickly making a good growth; the ground was cleaner and easier worked than the early sown land, but being on the low part of the field was badly frozen by an early frost the 1st of September and had to be cut before it had attained respectable growth. The blanks in the corn were all replanted June the 25th and 26th.

Cultivation.—As soon as the corn was nicely through the ground it was harrowed. Then the horse hoe was used almost continuously all summer. This kept down the weeds in between the rows, kept the ground loose and the continued stirring would tend to preserve the moisture in the land during the hot weather.

Manure—This is a point which may be taken up here as well as anywhere else. The value of a good coating of manure to a field intended to grow corn can hardly be estimated. The field this year had no manure, as a result the growth was uneven, even if it was a new field and in fairly good heart. Last year the same thing was noticed, the part of the field that was manured gave a good even stand of corn, while the unmanured portion was very uneven. The corn plant is one of the largest air-feeding plants we have, and weight for weight with other crops, is perhaps not so exhaustive on the land as they are, but the enormous yields of corn so frequently obtained make it after all an exhaustive crop. Its mass of roots indicates it to be a gross feeder, while the slow, poor growth it makes on unmanured ground, indicates that it has not the same powers of elaborating its food from the soil that other plants have, or if it has, the season is too short to elaborate the quantity necessary to make the growth we like to see, hence to get the best results with a corn crop, the field should receive a good coating of manure, this will insure a good, even stand of corn, because the roots will have an abundance of food ready for them to work upon, the growth of roots will be much greater, and the growth above ground will be correspondingly great. For experimental purposes, the ground should be manured, the growth then will be even for comparison, whereas on unmanured ground, the growth would be so uneven, definite results could not be counted upon. Where different varieties are being tested side by side, the ground should be manured to allow them to do the best they can. The best corn this year was a piece of about two and one-half acres, manured heavily for potatoes the year before, sown late, the 9th of June, its average height was eleven feet : there was a good development of ears; two average rows were weighed and shewed a weight of over twenty-two tons to the acre. A portion in another field was weighed to estimate the weight for the British Farmer Delegates and showed a weight of over twenty-five tons to the acre.

Results.—Some of the experiments planned and started were destroyed altogether or rendered useless by so much of the crop being drowned out or plowed up. In replanting the different varieties, it was found that some of them had suffered more than others, hence strictly accurate results cannot be obtained from this year's work, as the corn replanted did not come on evenly, and in a number of experiments the amount of corn sown a second time was so large as to render it worthless as an experiment. The cradle knolls, as already mentioned, proved another source of failure.

The second sowing of corn, or rather that which was planted among the other corn, was badly frozen, while the corn around it was not touched. A striking illustration of this was seen in a single stalk of corn growing on the six acres that had been plowed up. In some way or other it had escaped destruction and had attained a fair growth, the later sown corn around it was frozen almost to the ground, while it was untouched. This was evidently due to the larger percentage of moisture in the later grown plant, while the older plant, being more mature, with less moisture, was not affected in the same way by the frost. It was noticed in some of the last standing corn that the late sown corn amongst it was touched with the frost fully two weeks before the first sown corn showed any signs of the effects of the frost.

Table I. gives the results of experiments with different quantities of seed per acre in drills, the same width apart, and with drills different widths apart. It was tried with the Mammoth Southern Sweet, the Red Cob and the Giant Prolific Sweet Ensilage corns and the Pearce's Prolific field corn. The first three were a failure on account of the replanting, only the last one gave reliable results as it was not affected in the same way by the wet weather. Three hundred feet of two rows of each lot were weighed and the weight per acre computed from this.

TABLE I.

Kind of corn.	Lot.	Date of planting.	Width of drills.	Seed per acre.	Maturity.	Yield per acre.
Pearce's Prolific	4	May 31st..	3 feet	35 lb.	Roasting ..	21,998 lb.
" "	5	" ..	3 "	29 "	" ..	21,090 "
" "	6	" ..	3 "	20 "	" ..	22,207 "
" "	7	" ..	3½ "	18 "	" ..	26,451 "
" " ...	8	" ..	4 "	15 "	" ..	27,612 "

The average height of the corn was about six feet, at the time of cutting the grain in the ears was quite hard and nearly ready to cut for field curing. Every stalk carried an ear and many of them two good sized ears.

Lots 7 and 8 had a greater leaf development than the others, the leaves were also of a much darker green, showing a stronger growth. There were also a greater number of suckers, stronger and heavier stocks and a larger percentage carrying two ears.

In this corn we had quality, the quantity was also good. Last year the same kind of corn attained a weight of 16 tons to the acre. The growing period was about 100 days.

Table II. shows a comparison of the different varieties of corn grown side by side in single rows to discover the comparative degrees of maturity attained in 100 days growth, and also for a comparison of the yields per acre. Three hundred feet of each row was weighed and the weight per acre computed from these weights. The stages of growth were termed "Tasselling," "Silking," "Blossoming," "Out of Bloom," "Early Milk," "Late Milk" and "Ensilage." The number of ears on ten average stalks is also given.

TABLE II.

1890.					1889.	
Variety of Corn.	Average height attained.	No. of ears to every 10 stalks.	Stage of maturity or growth reached.	Green, weights per acre in pounds.	Stage of growth reached.	Green, weights per acre in pounds.
Chester Co. Mammoth	8 feet.	......	Out of bloom	35,458 lb.	Early milk	22,823 lb.
Calico Dent	7½ “	8	Early milk	32,210 “	Out of bloom	30,508 “
Mammouth S. Sweet	9 “	.....	Silking	29,548 “	Silking	33,810 “
Wisconsin Yellow Dent	8 “	10	Late milk	29,513 “	Early milk	37.149 “
Cranberry White Dent	8 “	6	Early milk	28,484 “	“	36.508 “
Leaming Dent	8½ “	7	“	27,472 “	“	28,333 “
Red Cob Ensilage	9 “	......	Silking	26,301 “	Silking	30,900 “
Giant Prolific Sweet Ensilage	9 “	......	“	25,982 “	“	25,230 “
Thoroughbred Flint	7½ “	6	Late milk	25,662 “	....	....
Hickory King	9 “	.....	Silking	25,448 “	Silking	40,530 lb.
Sheeps Tooth	8 “	.....	Early milk	25,183 “	“	41,220 “
South-Western	8 “	......	“	25,183 “	Blossoming.	37,140 “
Woodworth's Yellow Dent	8 “	9	Late milk	24,383 “	Early milk	29,087 “
Asylum Sweet	4½ “	6	Early milk	24,330 “	“	30,810 “
Edmund's Premium Dent	8½ “	8	“	23,798 “	“	34,481 “
Sibley's Pride of the North	8 “	8	‘	23,691 “	“	34,530 “
Wisconsin White Flint	7½ “	9	Late milk	23,639 “	“	37,468 “
Compton's Early	6 “	10	Ensilage	23,107 “	“	32,490 “
North Star Yellow Dent	8 “	10	Late milk	22,946 “	“	29,522 “
King Phillip	7 “	10	Ensilage	22,749 “	Late milk	31,987 “
White Flint	6½ “	9	“	22,679 “	Early milk	30,343 “
Champion White	8 “	......	Out of bloom	22,308 “	....	....
Wisconsin White Dent	8 “	9	Early milk	21,615 “	Early milk	33,205 lb.
Red Glazed	6 “	10	Ensilage	21,562 “	....	....
White Western	8 “	......	Silking	21,562 “	....	....
Giant White Southern	8 “	......	“	21,296 “	....	....
Horse Tooth	8 “	8	Early milk	21,082 “	Blossoming.	33,379 lb.
Golden Dewdrop	7 “	9	Ensilage	20,977 “	Early milk	30,585 “
Longfellow	7 “	8	Late milk	20,071 “	“	29,754 “
Angel of Midnight	6½ “	8	“	19,166 “	“	33,150 “
Pride of the North	7½ “	8	“	18,737 “	Late milk	31,504 “
Stabler's 2nd Early	4 “	......	“	18,686 “	....	....
100 day Corn	7 “	9	“	18,367 “	Early milk	23,775 lb.
Egyptian Sweet	5 “	5	Early milk	18,267 “	Blossoming.	37,300 “
Early Adams or Burtington	7 “	10	Late milk	17,953 “	Late milk	27,347 “
Hickox Sweet	4½ “	2	Early milk	17,950 “	Out of bloom	26,280 “
Pearce's Prolific	5 “	9	Late milk	17,462 “	Late milk	32,828 “
Parish White Dent	8½ “	......	Silking	16,611 “	Silking	33,666 “
Smut Nose	5 “	10	Ensilage	16,291 “	....	....
Tuscarora	6 “	10	Early milk	15,758 “	Early milk	23,954 lb.
Evergreen Sweet	4½ “	2	“	14,854 “	Silking	26,115 “
Self-Husking	6 “	10	Ensilage	14,800 “	Late milk	25,260 “
Canada Yellow	7 “	10	“	13,682 “	Early milk	28,170 “
Old Colony	4 “	8	Early milk	11,606 “	“	19,285 “

The Growth of Corn.—During the month of August nearly 600 measurements were taken of growing leaves and tassels of the corn. The object being to ascertain, if possible, the rapidity of the growth of the leaves and of the stalk when shooting the tassel.

For measuring the growth of the tassel plants were selected in which the tassel was just showing itself among the leaves, measurements were then taken of this as it grew until it had attained its growth. The leaves were taken in a similar way; they were taken just as they commenced to unfold themselves from the centre roll and to spread out. All the measurements were made from August 13th to 29th, at the same hour in the day and in the same order. The averages per day given in the following table are obtained from the daily measurements taken during this time. The maximum and minimum growths are also given.

TABLE III.

Number.	Average growth per day as obtained from the daily measurements.		Maximum growth.		Minimum growth.	
——	Leaf.	Tassel.	Leaf.	Tassel.	Leaf.	Tassel.
	inches.	inches.	inches.	inches.	inches.	inches.
1	2.03	2.03	3.37	4.37	1.00	.50
2	1.93	2.00	4.50	4.00	.50	.50
3	1.76	1.83	2.37	3.00	1.00	1.00
4	2.21	2.38	3.50	3.00	.50	1.50
5	3.00	3.22	3.33	3.75	2.50	3.00
6	2.33	2.64	3.12	3.16	1.00	2.00
7	2.1	2.32	2.50	3.16	1.00	1.00
8	2.15	2.30	.25	4.00	.50	.50
9	1.76	1.60	3.00	3.00	1.00	1.00
10	2.42	2.50	3.33	3.50	1.00	1.25
11	1.86	2.00	5.00	6.00	.00	.00
12	1.33	1.53	2.00	2.50	.50	.50
13	1.61	1.88	2.66	3.50	1.00	2.00
14	2.08	2.20	2.50	3.00	1.00	.50
15	1.22	1.77	2.66	3.50	.25	.50
16	1.86	1.93	3.00	3.00	1.00	1.00
17	1.80	1.55	3.50	2.50	.00	.50
18	1.86	1.90	2.50	2.66	1.20	.50
19	1.86	1.93	3.00	3.00	.50	.50
20	1.96	1.66	2.25	3.00	1.00	1.00
21	1.30	1.57	2.00	2.50	.50	.50
22	1.83	....	2.50	....	.50	....
23	1.41	2.17	3 50	3.25	.25	.50
24	2.30	....	2.00	....	.50	....
25	1.76	....	3.00	....	1.00	....
26	1.73	2.06	2.50	3.00	1.00	.50
27	1.80	1.83	2.37	2.37	1·00	1.00
28	2.10	2.13	3.00	3.00	.00	.50
Average	1.92	2.03	2.97	3.27	.69	.89

Conclusions.—All other things being equal, the rapidity of growth depends on the weather. This was noticed very markedly, a fine hot day always resulted in a very rapid growth, as high as three inches in the 24 hours and in one or two cases as high as five inches. If the day was cold the growth was very slow, in some cases none at all. The growth during the night was *nil.*

Filling the Silo.—This was commenced the 15th of September. The corn was cut with an ordinary reaping hook and allowed to wilt for about a day. Platform waggons, as described in Bulletin XLII. of the college, were used for drawing it to the silo. Here it was cut in two-inch lengths and elevated into the silo by a Smalley ensilage cutter and carrier. The power was furnished by the farm engine. The filling was somewhat irregular, as the farm needed the engine certain days in the week for cutting feed, etc., hence we would fill for a day or perhaps two days in one silo, then move the machine to the other silo and set up while the farm was using the engine ; cutting would be done here for a similar period when we would move to the other silo again. A man was kept in the silo constantly to tramp and level, special pains were taken to have the corners well tramped. Though the silos were thus filled rapidly no trouble was experienced in getting the required temperature for sweet ensilage. The corn being in the right state for putting in the silo the heat worked up through it very quickly. If the corn is in the right state when put in the silo there is no need for any delay in filling, it can proceed until the silo is full. Care should be taken in levelling a silo that the anxiety to have the sides firm and solid so that it will keep well does not lead you to forget to keep the centre the fullest. There will be more settling there than at the sides, and if not kept full when it settles will have a tendency to draw the silage away from the outsides towards the centre, and much waste may be caused thereby.

A covering of cut straw about one foot deep was put on the top of the silo at the new barn. On the silo at the dairy barn about one-third of it was covered in the same way, another third covered with uncut straw and the remaining third left uncovered. So far as appearances go and what testing has been done, the results are in favor of that covered with the cut straw immediately after the filling of the silo has been completed.

In the rapid development of the silo we have jumped from heavy weighting to no weighting at all. We may have traveled too fast, and may have to go back over some of the ground. I think there would be less waste on the top of our silos if some pressure were added ; the top is so loose that it is very difficult to prevent considerable waste. A weight would tend to press this loose top down and thus exclude the air from penetrating so far into the corn. The bottom of the silo gets pressed sufficiently, the top does not. We would not suggest heavy pressure of any kind only after the silo was full and ready to close up.

Shrinkage in the Silo.—The silo is a most successful way of saving green feed ; it is thought that this saving is effected without any loss in the feeding value of the food ensiled and without any shrinkage in weight. In saving corn in the shock in the field there is a loss in the weight and in feeding value. Some authorities put this loss as high as twenty per cent. and that we have a loss also in the silo of from ten to fifteen per cent of the feeding value. An experiment was conducted in connection with the silo, this fall, to ascertain if possible the real loss there may be in weight and feeding value. A box was made of wire netting, with the meshes small enough that no corn could get out or any get into it, yet not so close that when it was buried in the silo it would not be subjected to the same conditions as the rest of the contents of the silo. This box was filled with cut corn the same as was going into the silo at the time, closed up and buried in the silo A sample of the corn was taken for analysis, that we might know the composition of the corn that went into the silo. Some time after the silo was opened the box was uncovered, it was taken out and contents weighed ; when compared with the green weight that went in it was found that there was a shrinkage of 6.73 per cent. in weight. A sample was taken for analysis ; the comparison of the analysis of these two samples will show what loss there may be in feeding value So far these two samples have not been analyzed. We are thus not in a position to say what the total loss may be. The contents of the box were to all appearances as well preserved as the corn around it. In June a similar test was made with green rye; there was a little over 5 per cent. shrinkage in weight in this test.

Cost of Growing the Crop of Corn.—An account was kept of all the work and expense connected with growing the crop of corn and saving it in the silo. On account of the exceedingly wet weather in the spring, the expense of working up the land was increased somewhat, as some of it was worked up more than once. The six acres that was plowed up and re-sown added to the expense, and the crop it returned was so very small it greatly increased the rate per ton of the cost. Including all the experimental work, the cost of growing the corn came to a trifle over $2 a ton. Deducting the experimental work and allowing as good a yield on the six acres as was obtained on the rest of the field the cost was about $1.50 per ton.

4.—WINTER DAIRYING

The business of a farmer is to produce food; he may think it is to make money or to raise profitable crops that he can turn into money. But, are not all his crops food for either man or beast, or to be used in ministering to the comfort of man. The food of the land is supplied from the farm in one form or other. If the farmers' crops are good we find a prosperous year throughout the land; if, however, his crops are poor we find the reverse the case, truly he is the backbone of the country. Holding this honorable position is it not his duty, nay is it not demanded of him that he have a definite object in view in his work, and that he have his plans so laid that he may produce the largest amount of food possible from his land, that there may be happy and prosperous times throughout the length and breadth of the land. How many of our farmers are doing this? How many have a definite line of work laid out and are following it closely? Are not the large majority farming at hap-hazards, going in for one thing one year and something else the next, as changeable as the season, catching at every bauble that gives the appearance of good returns, but by the time he is ready to enjoy the returns, the bauble disappears and he is left lamenting.

Every farmer should carefully consider what line of farming his farm is best adapted to or what perhaps is of more importance the line of farming he likes best, that affords a sure and reasonable return for his outlay. Then let him make a specialty of this, develop it for all it is worth, stick to it year after year. If his choice has been reasonably made with a view to the demands of the market, he will find himself much further ahead at the end of ten years than if he had drifted about with no aim in view. It is a prevalent idea that it requires some extra ability to handle a specialty—it is not so, every man has a liking for a certain class of work; all the details of that work he masters easily—because he loves it—he thus soon becomes an expert at that species of work; but if he were doing a dozen different kinds of work would he bring them all to the same perfection he would the one? In the one case he must know *something* about a dozen different kinds of work, in the other he knows *all* about one kind. Which takes the most ability? We see this exemplified in all our large manufacturing establishments, it is all "piece work," one man does one thing and only one thing, he soon becomes so expert he can turn out double the usual quantity, etc. This is concentration of energy on one thing Our farming should take more of the nature of "piece work." "Specialty" is written all through manufacturing life, farm operations must partake more and more of that nature.

To a large majority of our farmers winter-dairying, as a specialty, offers sure and reasonably profitable returns for their labors. It will give them an aim, and without an aim nothing will be accomplished. As the specialist in the machine shop will have the latest labor-saving device, the handiest and best instruments for doing delicate work quickly and well, so the specialist on the farm must be up to the times in his line of work, his machines must be of the latest improved pattern and his tools of the best. His cows are his machines, artifical machines you may call them if you like. Most of the cows through the country milk only during the summer and dry up as soon as the cold weather comes on in the fall, this is as nature made them. There is nothing artificial about them, the only arts they seem to be perfect in is giving as little milk as possible and boarding on the farmer six months in the year. The artificial cow is largely the product of man's mind, her latent abilities have been developed, feed, breed, care and attention have made her what she is. We can greatly improve the product from our present stock in much the same way. First the cow must calve in the fall, instead of the spring, the milking period will thereby be very much lengthened, and she will be milking at a time when the farmer will have time to look after her; he will not be so busy that he will not have time to see whether she gets sufficient water to drink or that the pasture is so scorched that there is nothing to eat. This brings us to the second change, feed, shelter and attention. A noted breeder once said, " You feed a common cow like a Jersey and you will think you have a Jersey," and he might just as well have added that if you feed a Jersey like many men do the common cow, soon all you will have left of her will be her hide, because she has not been trained to stand hard fare and starvation. Some men may tell us our cows are tender, they are fed and petted too much, stables are too warm. They would like to see a cow that was *tough* and could *rough* it a little. But all this toughness and ability to rough it is at the expense of her milk returns. Motherhood, the origin of the milking period, is in every way opposed to roughing it, it is a tender period ; then again, the organs concerned in producing milk are very delicate, the third most sensitive organs of the body and most intimately connected with the nervous system. They should therefore have warm quarters, plenty of wholesome food, with the best of care and attention —feed her like you would a Jersey. It is possible in this way to nearly double the returns from your cows. It is the result of thought and skill applied to the cow to develop her latent powers. The heifer progeny of these cows, if sired by a bull of a milking strain, will be a great improvement on their mothers. " Train up a child in the way he should go," is certainly good advice for the human family. It is just as good advice to say " Train up a heifer calf in the way she should go when she becomes a cow." Now, if she is intended for a dairy cow, she should go first in the way of consuming the best milk producing foods, and second, of converting these foods into the largest possible quantity of milk—rich in butter fat—the fat being the chief valuable part of milk. Then feed your calf just such foods in order to train her organs of digestion and assimilation so that when she enters upon the real business of her life she will be able to convert as much as possible of these foods into rich milk. Feed the calf liberally so as to promote rapid growth and development, but avoid feeding her so as to make her unnecessarily fat. For in this there is danger in forming a beef tendency and habit, so that she will even take on the beef form to a certain extent more than she otherwise would, and quite likely to divert too much of her foods into the wrong channel for a dairyman when she becomes a cow. The other side of this feeding question is just as true. If the calf's stomach is injured by improper feeding the effects of it will last through her life. A habit will be formed of making a poor use of the food fed, such a cow will be an unprofitable one for a dairyman to keep.

Having the animal he wants or the artificial machine, he must have something to feed it. His cheapest feed he will find to be ensilage and soiling crops. His animals will not be suffered to scrape out a living on sunburnt pastures, but will be protected from the scorching rays of the sun, with an abundance of succulent feed before them. During the summer he will grow a lot of fodder corn for the silo that he may have feed enough to keep twice as many animals through winter as he used to do, thus furnishing work for his hired man the whole year. He will feed with his ensilage a ration of grain that his cows may produce abundance of milk which will be rich in butter fat. He will thus have products to sell when they bring the highest price on the market, for butter during the winter always brings a half more than during the summer months.

In handling the product of his cows he will ever be mindful to see that it does not lose any value in his hands. His object will be to produce as much food as possible, and send it out in such a form that he may gain a name for his article. He will thus be helping on the whole land to prosperity, and as he sees his animals growing and developing into superior animals he himself will likewise grow and be a better man from the exercise of thought, study and the close attention to business necessary to success. He will be a more obliging neighbor, a kinder husband and father and a better christian in consequence of having exercised the care, patience and kindness necessary to rear a good dairy herd of cows.

The Dairy Herd.—At the beginning of the year the herd consisted of fourteen cows. Of these three had been milking since the last of June and one from the first of October, 1889, the other ten were bought around Harriston and brought to the dairy about the end of November. One of them came in about that time, two or three more before the end of the year and the rest, all but one, before the end of February. The exception was one which proved not to be with calf, she was afterwards fatted and sold to the butcher. So the herd really consisted of thirteen milking cows, four of them not giving much as they had been milking some time. In February one of our best milkers lost her milk through inflammation of the udder, hence from that time our number was only twelve. The majority of them proved good milkers. Each milking was weighed by itself and a record kept. In this way we know what the cows are doing. This test for the year found some of the cows wanting in quantity, as four of them were under 4,000 lb. a year. It was decided to sell them and fill their places with others. The best cow gave nearly 9,500 lb. of milk for the year. Several others gave between 7,000 and 8,000 lb.

They were fed corn ensilage morning and night, a few pounds of hay at noon. The ration for the day was 50 lb. corn ensilage, 5 lb. hay and 6 lb. meal. This food cost twelve cents a day. The cows were kept in the stable the whole time. They were not turned out to pasture until the end of May.

Ensilage as a soiling food.—All the ensilage was not fed up by the time the cows were turned out. What was left was covered and saved with but very little waste until August when it was uncovered and fed. It was found to be in as good condition as when we quit feeding from it in May. The cows ate it readily. The pastures were pretty bare so they lived on the ensilage entirely. The feed was the same as in the winter. During the day the cows had the run of a small field where there was plenty of water and shade. During the night they were in another field nearer the stable, but the pasture was no better.

Results.—Before they were fed the ensilage the cows were beginning to fail on account of the short pasture, and had they continued on the pasture the failure in milk would have been serious, as there was no fresh pasture to be obtained at the time. The flow of milk was sustained and even increased, for at the close of a month's feeding they were giving a trifle more than at the start.

Handling the milk.—The milk was set in deep pails in ice water to raise the cream. Skimming was done with a conical skimmer. The cream kept sweet until ready to ripen for churning, which took place every afternoon. It was found we got the best results when the cream was churned at a temperature of from 66° to 68° Fahr. A Daisy churn was used. Butter was salted at the rate of about one ounce to the pound of butter. Most of the butter was marketed in Toronto. A student was sent to the dairy every afternoon for instruction, and every facility afforded him to learn the most approved methods of handling the milk, cream and butter, as well as the care of dairy stock. During the summer the cream was sent to the creamery.

I have the honor to be, Sir

Your obedient servant,

GEORGE HARCOURT.

ELEVENTH ANNUAL MEETING

OF THE

AGRICULTURAL AND EXPERIMENTAL UNION.

The eleventh annual meeting of the Ontario Agricultural and Experimental Union was held in the lecture hall of the Agricultural College, Guelph, on Thursday and Friday February 6th and 7th, 1890.

Mr. J. A. Craig, B.S.A., President of the Union, occupied the chair, and after the roll was called the minutes of the previous meeting were read and approved.

Mr. N. Monteith, Secretary-Treasurer (*pro tem.*) then presented the following financial report, which was signed by the Auditors and approved by the Associaton :

TREASURER'S REPORT.

Receipts.	$ c.	Disbursements.	$ c.
To amount on hand from last year	64 92	By grain experiments, fertilizers, etc	67 35
" government grant	200 00	" bee "	15 00
" extra membership fees on 1889 account.	12 50	" postage, telegram	19 12
" membership fees on 1890 account	22 50	" printing, reports and stationery	64 00
		" editing reports	35 00
		" expenses of com. to Toronto	5 00
		" cattle experiments, circulars, etc	2 05
		" balance	92 40
	299 92		299 92

THE PRESIDENT'S ADDRESS.

J. A. Craig, B.S.A., Toronto, Editor *Canadian Live Stock and Farm Journal*, then read his annual address, as follows :—

Gentlemen—It devolves upon me as a pleasant duty to welcome you all to our annual reunion, and this I do with all the heartiness and cordiality at my command. To our visitors we extend the free hand of friendship and invite them to reason with us on the burning questions of our agriculture, to the graduates and associates we give fraternal greetings, trusting that the old fond days of student felicity may once more be experienced unalloyed, whileto the students and professors we offer glad welcome to our consultations, hoping that the outcome of all our efforts may be reflected in some degree in our after work as well as strengthen and upbuild to a greater height of power the institution we all love to think upon, talk about, and glory in. It is one of the soundest economical truths of the age that the broad grindstone will sharpen the axe quickest, and so in touch with this, we, as a society, seek to sharpen our wits by the breadth of mind esulting from the presence of many.

A decade has swept rapidly by since this society of ours launched out on its course with the laudable and extended work before it of binding the alumni of this college together for her and their good as well as to endeavor to raise our agriculture to the status of a skilled art and sound science, and if I correctly draw conclusions from the past, and if I peer not too optimistically into the future, the years to come will be pregnant with greater results and fraught with close unity. Our caption implies that we are a union, but it fails to express to the uninformed mind the great truth round which all others swirl that we either as students, ex-students, graduates or friends of the Ontario Agricultural College, are bound together as a unit to extend the usefulness of our alma mater. Fealty to our college and her cause is the cementing material that holds together the foundation and superstructure of this union, and this allowed to weaken through oversight presages the collapse of the whole structure. The connection between our society and the college deserves a first place and the highest honor in our estimation when considering the elements that have contributed to the success of our union. It has appeared to me that in the past this desired unity of all for the good of the one, though at all times apparent, yet has never been accredited with the importance that is due it and the fruits of this are to be seen in the number of the college alumni that annually gather here. Our weakness, and it is well that we should know it, is that we cannot bring out the number of ex-students, associates and graduates that should attend ; this statement is grounded on the fact that there are hundreds of such throughout Ontario. Why is this ? It may be a matter of dollars and cents with those far away, but it cannot be so with those near at hand. It seems to me that not considering their presence according to its true value there never has been a very strong bid made for their attendance. As a means of in part remedying this condition of affairs we should in our programme, give greater prominence to the discussion of collegiate matters, and through this means keep up the interest in the college in the minds of all the alumni. For some time past I dotingly mused on the pleasure I would have in broaching to you the subject of a college paper, but I am happier now in spending words that otherwise would have been used in advocating this measure, to give cheering encouragement and express warm gratitude to the active and able movers in this important matter. As the review greatly strengthens the bond of union between friends outside the college walls with those within its campus, so must it serve to make this union of ours stronger in every way. The scheme that I would have advanced would be to make it not only an organ of the O. A. C. Literary Society but of the Experimental Union as well, and it is still an opinion of mine that such a step might well be taken yet. As we are all aware there has always been a great delay in issuing our reports, and this has been the fault of the printer and not of the compiler. Being an organ of the society the results of the experiments and doings of this meeting would be made known through its pages long before it would reach the anxious experimenters through the usual tedious course. It would devolve upon the Union to bear some of the expenses of publication of the Review but that would not be considerable. This suggestion I commit to your charge. I have thought that in our brief sojourn here we do not extend our acquaintances among the students as we should. We are not here to merely criticise each other coldly from a distance and drop comments as to the evolution of the Ontario Agricultural College graduate, but we are here to know of each other and co-operate with each other in helping along our good cause. Means should be considered such perhaps as the adding of a committee on reception to our list to make our meetings more genial in that respect, and further also provide, as far as possible, for the accommodation of visiting alumni in the college. It dampens their ardor and tempers their zeal to seek the modest inns of Guelph, and I am sure that I voice the opinion of every graduate here when I say that they would willingly pay double the hotel charges to be allowed to make their home in the college while here. Repose this duty in the charge of the students and thus bind them up with the interests of the union as much as possible.

The most practical phase of our work is that of experimentation and in respect to this it seems to me better to urge a thorough development of the various lines of experiment we now have in hand rather than weaken our forces by branching off into anything new. It has been said by Coleridge that experience is like the stern lights of a ship which illumines only the track it passes over, and we may extend this simile by saying that experiment is the brilliant headlight that illumines the path before. Agriculture has long suffered for the want of experimenters to solve the many perplexing questions of practical import that are continually cropping up, but that day is past and now we find farmers and scientists, though long estranged, brought into close contact, with benefit to both, through the medium of experimental stations and associations such as ours. That the results of experiments carefully conducted and bearing on the practice of the farm are appreciated, is reflected in the energetic efforts that are being made in the establishment of stations in all countries. In our own Ontario and the older Provinces of our Dominion the bottom has been completely knocked out of grain farming, and moreover it is a bottom that will require the best knowledge and finest skill to restore. Be it our work to do this through the medium of our experiments.

The data we are constantly collecting through our fertilizer and grain experiments that deserves emphasis by repetition, is that each experimenter determines the best fertilizer and grain for his own soil and conditions, that no experiment station can do for him. It was a timely suggestion that was made by my predecessor in regard to experiments in respect to our live stock industry, and I am pleased to know that his suggestion has been acted upon. This is a field for our Union worthy of it, for there is now in Ontario a strong reaction going on in favor of this interest, and it means that in a few short years Ontario will be the stockman's paradise of this continent, and as the interest grows the value and appreciation of our experiments will become greater.

In conclusion let me say our footpath through the labyrinth is already blazed for us, and all that we need is hearty co-operation, generous enthusiasm, and universal encouragement, and under such conditions the objects that gave birth to this society must gradually evolve into accomplished realities. Many of us rest too long after we hoe our row, but this should not be ; for this Union to make permanent progress in the work before it, must ever have your interest, your best efforts, and the benefit of your counsel.

Having these, optimistic though I may be, I cannot with any degree of surety mark the limit of usefulness of this Union not only in keeping us shoulder to shoulder in the ranks of college defenders, but in elevating to a higher position in the industrial, intellectual, and social world, that industry with which we are all proud of being inseparably connected.

It was moved, seconded and carried that Messrs. Sinclair, George Harcourt and Cowan be a committee to consider the points in the President's address and report at a future sitting of this meeting.

THE MINERAL EXHAUSTION OF SOILS.

A paper on this subject, as indicated by the composition of wheat grain, prepared by A. E. Shuttleworth, of McGill Gollege, Montreal, was read by Mr. C. A. Zavitz. When asked by your committee to prepare a paper for this meeting, know-ng it would be impossible to attend, it seemed to me advisable that only members from mong those attending the convention should contribute papers. This I thought advis-ble because your time should be most profitably occupied, and, as written articles are ot clear always in every detail, no one should be more helpful during their discussion han the author himself. However, even under these disadvantages, the committee have xtended to me the privilege of noting a few observations for your discussion ; and a eeling of obligation to the Ontario Agricultural and Experimental Union, and an in-erest in the work it is laboring to advance, move me to comply with your request.

Before entering upon the subject matter of my paper permit me to make a few re-arks about this society's position. The greatest recommendation it can offer is that it aims to be useful. Such a purpose wisely directed always results in much success. In degree of time, this Union, is just entering its second decade; while in degree of useful results, it is only commencing. Do not misunderstand me. Time has not passed in vain for the difficulties of experimental work are such that, before the best working system is established, certain experience must have been gained, and before desirable results are obtained, a system must be established. Much of this experience has been gained, and you are prepared now to complete the establishment of a "sound workable system." Why emphasise the sound workable system? Because the varied climatic influences and the soil variations make it inevitable that, in order to arrive at definite and applicable conclusions, experiments must be continued for a great number of years and in a variety of localities. The establishment of this kind of work under these necessarily associated conditions requires careful scientific and practical direction at the outset; and it must be pursued patiently and regularly. There may be many papers and sufficient discussion at these annual meetings since these are the easier and more popular part of our task. But the real difficult and foundation work is in performing the experiments leading to additional light that, year by year, will be added to the table of results. Its difficulty lies in the constant attention, the patience, the perseverance and the exactness involved in successfully conducting an experiment; and it may be regarded as the fundamental work because experiments, successfully conducted, afford practical facts. These practical facts gathered from varied and numerous conditions can be profitably discussed, arranged and recorded as useful information. But, on the other hand, carelessly conducted experiments are not only unprofitable, but they are also positively injurious by misleading and wasting the time of those who may unfortunately read or discuss them. Therefore, be careful that those conducting your experiments are in these different ways qualified; and encourage such to continue by a proper appreciation of their work.

In preparing this paper for you, I do not profess to advance or discuss what hitherto may be unknown to you, but rather to bring to your notice a few observations and facts that may lead to more light upon the conduct of partially mineral exhausted soils.

Even with a soil, naturally as fertile as the loams and clay-loams of Ontario are, exhaustion or weakening of its productive power accompanies or follows continuous cropping under what, probably at this age of scientific agriculture, may be spoken of as injudicious cultivation. Illustrations of this are afforded us from localities where grain production has been conducted since their earliest occupation, and where this has been the only or principal branch of agriculture followed. Districts in which the improvement and increase of live stock are only secondary or almost neglected. Such for instance as are designated by the name "wheat and horse districts." In many of these districts mineral exhaustion of soil exists to an alarming extent, and its effect has and is creating a great deal of restlessness among the farmers. It is perfectly obvious to all thoughtful men, practical as well as scientific, that hard cropping under bad management must in time lead to exhaustion in the soil. The nature and the manner in which it is indicated will depend upon various existing conditions of soil and soil treatment. With these I only delay in so far as they bear upon the observations to be presented in this paper.

A soil, consisting of clay-loam, has been under cultivation since 1835, and subjected to a rotation of cropping as follows:—Breaking up from sod, pease are grown, followed consecutively by oats; turnips, with fifteen tons farm-yard manure per acre; wheat or barley, seeded; hay two years; and pasture one. Occasionally, and of late years more frequently, the turnip crop was substituted by a fallow in view of cleaning. The manure applied was such as is made from the ordinary stock of a farm where hay and roots are fed, but little coarse grain, bran, oil cake, etc. This manure was applied in sufficient quantities to the above soil, and which soil now possesses an accumulation of organic matter. No mineral manures except gypsum occasionally have been used. Under this management, this soil continues to produce abundant crops of straw, hay, etc.; but for the last ten or twelve years it has failed in one important respect. It does not produce anything like so good a quality of wheat grain as previously. Even under most favorable climatic conditions the grain is deficient in plumpness—weight per measured bushel—and in flour producing quality. In season for instances when the yield of spring wheat exceeds twenty bushels per acre and, generally speaking, is fairly plump, the grain will not produce a good quality of flour, *i.e.*, flour from which can be made a light and palatable bread. Yet the soil in good seasons produces increasing quantities of course grain, straw and hay.

These matters are the more intesesting because they are personal observations of facts existing under natural conditions. But one cannot regard such a condition of soil interesting in itself, but only as it reveals more clearly nature's laws, and, by indicating what greater evils may follow, leads to studies and practices enabling the soil to continue productive and profitable.

In view of this, these few observations have been made and their studies pursued as far as time and other duties have permitted. In ascertaining the cause of a revealed fact, other facts, resulting from parallel natural conditions should be included in the study. This has been done as far as opportunity afforded; and comparatively with this poor wheat, the product of the above soil, a sample from practically similar clay-loam, but which has been cultivated only ten years, is studied. By so doing, one is carried back forty-five years into the soil's natural capabilities. This similar clay-loam from which the other sample of wheat is grown is situated on the same farm, subjected to similar climatic, conditions and under similar management. But, while the former has been under cultivation for fifty-five years, the latter has been cultivated only ten years, having been cleared and broken up in 1880. Upon these two soils spring wheat of the same kind was sown in 1889, harvested, threshed and examined separately. In round numbers the yield from the former or old soil was a little over twenty bushels per acre, and that from the new soil a little over twenty-five. The straw on the old soil was probably more abundant and decidedly more inclined to crinkle and develop rust. But the grain of the new soil was brighter and plumper. Of these wheats I made rather careful examination in view of obtaining what might assist in ascertaining something of the old soil's exhaustion. In comparing the composition of these two samples of wheat for brevity and clearness, the one grown on the new soil may be called No. 1, and the other No. 2.

Spring Wheat.	Yield per acre.	Weight per bushel.	Weight of 100 berries.	Per cent. of total ash.	Per cent. of nitrogen.	Per cent. of phosphoric acid (in ash).
No. 1 (new soil)	25 bush....	60.5 ℔	4.45 grams.	1.98	1.989	51.93
No. 2 (old soil)	20 bush....	58 ℔	3.05 grams.	1.96	1.980	46.47

By examining No. 2 comparatively with No. 1, something may be learned regarding the nature of the defect in this old soil. To the most casual observer, although the two samples are the same variety of wheat grown from the same seed, etc., a marked distinction in plumpness and brightness would be observable. Regarding their weight No. 1, or that grown on the new soil, was decidedly heavier. By weight per measured bushel, No. 1 stood 60.5 lb. and No. 2 only 58 lb.; and upon a delicate chemical balance 100 berries of No. 1 weighed 4.45 grams, while the same number of No. 2 weighed only 3.05 grams. These weights are the average of several examples; and by them alone, according to English authority, No. 1 being the heavier, possesses higher qualities in other respects. Passing on to their composition, there is regarding total ash a percentage of 1.98 in No. 1, and 1.96 in No. 2. This cannot be called a marked difference, however, it indicates a tendency to a lower ash percentage in wheat No. 2 grown where nitrogenous matter is in excess, and mineral matter is deficient. At Rothamsted where the average for a number of years is given, the wheat grain grown upon soil made highly nitrogenous by the repeated application of ammonium salts, but no mineral manures, contained 1.82 per cent. of total ash. While the wheat grown during the same period upon a soil in which the nitrogenous and mineral constituents were proportional contained 1.91 per cent. of total ash, likewise, pointing to the fact that a highly nitrogenous but minerally exhausted soil produces a product of lower ash percentage.

Although probably less distinct is the difference in the nitrogen percentage of these two samples of wheat, however, the examination is even more interesting; and a reference to it will be profitable. A very careful and prolonged nitrogen analysis was made, but the results at first seemed contradictory to what one would expect. The nitrogen in each is almost the same, No. 1 containing 1.989 per cent., and No. 2, 1.980 per cent. It may be well to observe that No. 2, the one a little lower in nitrogen, was grown on the old soil which, as stated before, is rich in nitrogenous manures. It seems more probable at first thought that this soil should yield grain also rich in nitrogen, being itself rich in nitrogenous manures. But after examining the ash constituents and finding that No. 2 ash was particularly low in certain of them. I compared these facts with the tables of the Rothamsted experiments. Their results go to show that mineral exhaustion may accompany excessive nitrogenous accumulation in soils, while the wheat grain product shows in a marked degree a deficiency in nitrogen. Their facts are, so far confirmed in these observations, a soil rich in organic matter producing a wheat-grain product lower in weight, in percentage of total ash and nitrogen, than the same variety of product grown upon a new soil and one evenly balanced in the elements of manure.

These facts appear to indicate mineral exhaustion in wheat producing elements in the older soil; and this opinion is strengthened after comparing notes upon the percentage of phosphoric acid. In mineral exhaustion, especially when accompanied by accumulating quantities of nitrogenous manures, deficiency in the ash constituents of phosphoric acid is of all other constituents the most marked. The analysis of these ash products show No. 1 to contain 51.93 per cent., a high average, and No. 2 to contain 46.47 per cent., much below the average, pointing unmistakably to the conclusion that the old soil is becoming exhausted in available mineral elements. With further development of the nature of this soil's exhaustion in available mineral matter greater light may be obtained. Even with these few facts lessons can be learned. For by comparing two similar products produced under similar climatic conditions, but the one upon a soil—though a clay-loam as the other—that has been farmed for almost fifty-five years, we have found a condition bearing out authoritative statements, the result of years of close and patient agricultural investigation. A condition also that appears reasonable, and that can be easily comprehended by practical farmers. A soil that with the lapse of time, and under what hitherto has been considered good management, is capable of producing crops of greatly increased bulk though in composition and maturity of grain deficiency. A deficiency that is more than theoretically interesting for it is practically unprofitable. The other soil that has been cultivated only ten years, but, otherwise, under similar conditions, produces in the same variety a plumpness and a quantity that is entirely satisfactory.

What are we to learn from these facts? We have repeatedly heard it said, "Make plenty of farm-yard manure and your land will never suffer." But this statement is too broad and undefined to be a universal guide to the farmer; for quality of manure has everything to do in determining its useful effect. Time will not permit here a consideration of what this quality should be, and besides that is pretty well known. In concluding it may be remarked that to a practical mind these few observations on mineral exhaustion of soil, indicated by the composition of wheat grain, may suggest inquiry and thought, thereby avoiding the unpleasant loss of time and means in learning by bitter experience what may be foreseen by observation. Moreover this single example illustrates a very general evil in Ontario which in time, if it should continue and extend, will mean a great loss to our Province.

The President—We should feel very thankful for Mr. Shuttleworth's paper as it indicates many practical points brought out.

Mr. Sinclair—Will purchasing wood ashes be the cheapest method of increasing ash material in old soil?

Mr. Zavitz—That would be a cheap method of supplying a part of the ash constituents to the soil, especially the potash. The experiments conducted by this Association have shown poor results from fresh wood ashes when applied in the spring to cereal crops. The fertilizer tests for two years now over Ontario show those used to have given the greatest increase in yields in the following order, commencing at the best: Superphosphate, farmyard manure, salt, ground apatite and fresh wood ashes, while no fertilizer came lowest.

The President—Wood ashes are very beneficial in gardens, especially as top dressing for onions.

Mr. Zavitz—Cereal crops are not usually benefited much by potash manures. Wood ashes usually have the greatest influence upon turnip, clover and other leguminous crops.

Mr. Sinclair—In my experience I have found ashes give good results with the oat crop, and also in the orchard.

Mr. Zavitz—Did you have any oats which did not have ashes applied?

Mr. Sinclair—Yes, and these were not so heavy and stood up better than those which had ashes applied, and which were much lodged. I have no definite figures to show the different yields from the crops.

Mr. Sleightholm—How many bushels of ashes did you apply.

Mr. Sinclair—About 25 bushels per acre, and not so heavy in orchard.

Mr. Hutt—Was there any perceptible difference where the ashes were applied in the orchard?

Mr. Sinclair—Ashes were applied in spring. I think the fruit was better and there was a larger crop where ashes were applied.

QUESTION DRAWER.

Q. How do the feeding values of bean, shorts and wheat screenings compare in feeding value?

The President—I think it would pay to sell grain and buy these substitutes, if bran can be bought for $10 and shorts for $14 per ton.

Mr. Sinclair—In my experience I have found it best to sell some and buy some, so as to have portions of both.

Mr. Dean—A great deal depends upon what there are to feed. If milch cows, I would buy bran.

The President—Dairymen are favoring feeding pea meal very much, and many strongly favor feeding meal when cows are upon pasture.

Mr. Sleightholm—I think it would be profitable to buy bran and shorts as a change in food, but in my opinion $12 a ton is quite high enough to pay. I consider bran a very beneficial food.

President Mills—The mixture which Mr. John McMillan, of Huron, is using this winter is as follows: Two parts pease, 2 parts barley and 1 part bran. Of this mixture he feeds about 3 lb. per day, with some ensilage and cut straw and hay in fitting steers of 1,200 to 1,400 lb. each for finishing on the grass. This ration costs from 9½ to 10c. per day. Mr. McMillan sometimes substitutes roots for ensilage. He soiled thirty head last year and likes the system so well that he intends soiling twice the number next summer. In making estimates he always reckons the manure to counterbalance the labor.

Mr. Hutt—Does he keep his animals in the stable all the time.

President Mills—He gives exercise to his animals, as they are then better able to stand the sea voyage, but for home use he would not give exercise. He ventilates the stables when the animals are out.

Q. What kinds of soil are most benefited by lime?

A. E. Rennie—I have had a good deal of experience in lime on very heavy soils, and it has a very beneficial effect in making it more friable, although the section in which it was used contained a considerable quantity of limestone.

Mr. Hutt—Prof. Storer says that lime acts upon the nitrogenous matters in the soils and has a tendency to impoverish soils.

President Mills—I think if the supply of humus is kept up there will be good effect.

Q. Can we undertake live stock experiments, and should there be any remuneration for the work?

The President—I feel that we should let the Experiment Stations lead in this matter, and let us follow and glean the results. They have appliances that we cannot have, and can carry on this work much better than we are able to. We should verify experiments of the stations, rather than undertake much new work.

Q. When and in what form can nitrogenous manures be procured?

The President—I think that the best place for procuring nitrogenous manure is in the barnyard.

Mr. Zavitz—I expect this question has special reference to commercial fertilizers. A number of nitrogenous fertilizers can be obtained from the Ontario fertilizer companies. Sodium nitrate is one of the strongest and most readily soluble of this class of manures, and can be obtained at Smith's Falls for about $60 per ton. Ammonium sulphate is another fertilizer used considerably. There are fertilizers made from refuse of pork factories, and from wood waste which contain a good quantity of ammonia and are being tried in some parts.

Q. Can the farmers' institutes be carried on over Ontario, without taking so much of the time from the college professors?

The President—This is a vital question and should be thoroughly discussed here. The primary object of the institutes was to give encouragement to the local talent, but the local men have not taken hold of the institutes as they should.

Mr. Bowes—I think the professors are the ones to come out and give us information.

The President—I consider the farmers are relying far too much upon the professors. It is detrimental to the college and is also very hard upon the professors.

Mr. Rennie—It is one of the best possible advertisements for the professors to go out and get a personal acquaintance with the farmers. The professors prepare themselves sufficiently for the work, but if they are taken too much from the college now, there should be other arrangements made as the institute work is continually increasing. I think far too much is expected from the college professors.

Mr. Sinclair—I consider that the professors are doing a work over Ontario that cannot be done in any other way. I think it is the best thing that can be done to both the college and to the farming community.

Mr. Bowes—Surely the increasing demand for the college men is the strongest point possible in having them go out.

Mr. Dean—From the students' standpoint I would suggest that more of the ex-students should take these places; all they want is encouragement. If the farmer wants to be developed he must take hold of these matters himself.

Mr. Marsh—I think both the professors and ex-students should be sent out; they would carry weight with them, and the college would be better known among the farmers.

The President—We should interest ourselves in this matter. As an ex-student I would not like to have the professors lose their hold on the institutes.

Mr. Robinson—I agree with Mr. Dean, that too much work is put on the professors; leave the local men to swim also.

President Mills—I have had the most of the thinking to do in this institute work since 1884. We felt there were many mistaken ideas among the farming community, regarding the college and the work done by the students. Michigan had institutes which were assisted by the professors. It was our previous custom to have two weeks vacation at Christmas and two weeks again at Easter, and after talks with the Hon. A. M. Ross, we decided to drop out the Easter two weeks and have the four weeks at Christmas—three of which could be devoted to institute work. I have no objection, personally, to dropping the work, but I feel it has been of a great deal of advantage to both the farmers and the professors, in the past. I would at the same time have no objection to severing the professors from the institute work, but would never consent to have the professors go and come at various times during the winter. There are certain times that the institute lecturing could be done. Before Christmas there would be two weeks, and after New Years there could not be more than about four weeks. This would allow of three sets, comprising 27 institutes. We give the professors three weeks to go out at New Years, and the professors ought not to go out at any other time. I have invariably advised the professors not to go during the college sessions. If the professors go at all they must go at Christmas. How could their places be best supplied by others? I take the ground that we want to get the best men for the institutes. I know three men in Ontario away from the college whom the farmers will accept. They want a professor. The best men should be sent, and the first place should be given to the ex-student, when they prove themselves well capable for the work. The question finally comes to this: Shall we have the institutes as they now are, or sever our connections with them? In reference to the matter of having shorter Christmas holidays and letting the students home two weeks earlier in the summer, I think there is undue value put upon the two weeks in June, as it is between seeding and haying, and next to January there is no month less urgent than the month of June. In Michigan the holidays are from September to April. I would be a wonderfully relieved man if you could see your way clear to run the institutes to good advantage without the assistance of the college staff.

The PRESIDENT—There seems only two ways open to us; first to keep the institutes as they are now held in January, or second, to sever the connection of the professors from the institutes, and I would very much favor the former.

REPORT ON THE PRESIDENT'S ADDRESS.

The committee appointed to consider the President's address made the following report, which was adopted:

We, the committee appointed to consider the points taken up in the President's address, and summarize the parts which it was considered best to bring again before the meeting for their action, beg to submit the following:

(1.) That the Association devise some plan to induce a greater number of ex-students to attend the annual union meetings.

(2.) That a reception committee be appointed from among the students each year.

(3.) That *O. A. C. Review* be made an organ of the union also, and that a committee of three be appointed to meet the paper staff, and ascertain what arrangements can be done.

(4.) That there be a greater development of live stock experiments, by having not too broad a field but a definite line of work.

BARNS FOR ONTARIO.

BY J. B. BOWES, PINKERTON.

"A thing of beauty is a joy forever."

A barn of beauty to the farmers of Ontario in their present pinched condition is one that will give the greatest return for money invested

A barn should be durable, convenient and safe, should be one that has stables underneath for horses, cattle, swine and poultry, also root-house, or silo, or both. The great objects to be desired in having stabling underneath are warmth, economy of labor, and, where practicable, one roof covering two buildings.

To build a barn it is not necessary to have square timber, as planks spiked together is all that is required for the frame.

Building a barn high is no barrier since rack-lifters, hay-forks and slings have come into use The height of a barn can be determined by the amount of fodder required in the stable, and the safe resistance to eighty-five mile an hourwinds.

The dimensions of a barn that I would consider of sufficient accommodation on one hundred acres of cleared land, are as follows:

One sixty feet square, with either end or side drive, and with twenty-four posts on the sides, with the roof at an angle of 45° all the way to the peak; four bed sills to support centre of frames; four bents, twenty feet apart; barn floor fourteen feet wide, twelve feet high; the feed passages of stable at right angles with the barn floor; girts every six feet, two main and four purline plates, I would consider a first-class plan of a stable. I have seen several stables spoiled, as far as the comfort of the cattle were concerned, by the space between the gutter and the manger being very short. Too short a space compels a beast to lie with a portion of the body hanging over the gutter, and in many cases I have seen the animals lie almost half way over. Especially with cows does this condition of affairs produce the greatest amount of dirt, to say nothing of the uncomfortable position. The posts to support the superstructure are in the mangers, where they are least in the way. The size of manger depends upon the kind of fodder. A convenient size for all purposes is one eighteen inches deep, sixteen inches at the bottom, and twenty at the top. The length of floor for cows of twelve hundred weight should be seven and one-half feet from passage boards to gutter. A steer can do with much less. The different rows should be made to suit the size of animals that are to occupy them. The slope on the floor if made of blocks should be at least one-half inch to the foot, cows and heifers will do with less. Stalls for two twelve hundred pounds cattle are sufficiently wide at six feet three inches clear of sides.

The silo is next the wall in the centre mow, and occupies part of the room generally alloted to roots. It is six feet wide, by eighteen feet long, and thirty-two feet high, as it extends from the floor of the stable to the main plate, and is divided off perpendicularly into three bins, six feet square, the corn to be elevated into these bins by means of the hay-fork, or slings with car on a track extending from the centre of barn floor to the silo bin, about thirty feet high. A box with a trip bottom is about the best thing to use. Those three bins will hold sufficient silage for thirty-six head of cattle for ninety-six days. I consider that this silo can be emptied from the bottom; that the immense weight will make it follow down as it is taken out, although it seems to be the experience that it will not settle. The best plan so far is to take a board or two off of the outside casing at the bottom, and fling the silage down between the inside and outside casings, portions of inside casing to be taken off as the silage is taken out.

The watering of stock without letting them out of the stall and having water in front of them at all times can be accomplished by having a metal or other cup in the corner of the manger large enough for the animal's nose, the height of water in the cup being regulated by a float valve in some part of the stable shutting off the supply. Water will rise to its own level, and the water in the cups will not rise higher than the float valve box, as the beast drinks the water flows in till it again finds its own level The chief supply of water must be higher than the top of water in float valve or regulating box.

I find from practical experience that swine can be kept in the same stable as the cattle, and produce no bad smell, if cleaned out regularly and given a fair amount of bedding. By the arrangement of passages of stable you can get from any part of root-house or silo to any place in the feed passages without opening a door.

My object in having the roof of the barn at an angle of 45°, or half pitch, all the way to the peak is to allow the hay-fork more room. By having a roof at that angle you can almost fill the barn without touching a fork full. The only real objection there is to a high barn is found when we come to thresh, it is almost impossible to get the straw up as high as the grain was formerly.

The PRESIDENT—I think it is almost universally adopted to take silage out of the top of the silo, and this is best done by means of a chute similar to the one in the silo here.

Mr. SINCLAIR—What floor have you in your stables?

Mr. BOWES—I am in favor of cedar block floor. I use it all the time. Where the cattle stand I prefer blocks, but planks where the wheelbarrow runs

President MILLS—Do you pour on pitch?

Mr. BOWES—No; I do not, the floor is ratherdamp.

President Mills—Have you used a track to fill the silo

Mr. Bowes—No.

President Mills—Is it too expensive ?

Mr. Bowes—No ; I consider it a very cheap construction.

President Mills—How are your stables ventilated, Mr. Ballantyne ?

Mr. Ballantyne—By shafts, running from the edge.

THE SCIENTIFIC PRINCIPLES UNDERLYING THE MAKING AND FEEDING OF CORN ENSILAGE.

By C. C. James, M.A., Professor of Chemistry, O. A. College.

The making of corn ensilage began in America about fifteen years ago, its development belongs to the last ten. To-day the growing of corn, the production of ensilage, and the feeding of it to stock are among the most extensive and most numerous of the experiments carried out at the experimental stations of Massachusetts, Maryland, Connecticut, New Jersey, New York, Ohio, Kansas, Missouri, Minnesota, Wisconsin, and Ontario, and it is upon the results of these that the present address is based. From the multitude of opinions and results I have carefully endeavored to separate the hypothetical from the actual, and to draw reliable conclusions based upon a wide range of experiments.

I shall divide my subject into three parts ; the corn put into the silo, the process of making ensilage, the use of the ensilage thus produced.

Out of nothing nothing comes. Good ensilage can be made only from corn of good quality. What comes out of the silo depends upon what goes into the silo.

Circumstances affecting the quality of the corn are :

1. Variety of corn.
2. Nature of soil, method of preparation, fertilizers used.
3. Method of growing corn, whether broad casted or drilled, cultivated or uncultivated.
4. Season.
5. Stage of maturity at time of cutting.

The chemist is concerned principally with Nos. 3 and 5.

3. *Method of Growing.*—The general conclusion of experiments at all stations, based on chemical analysis and actual feeding tests, is that the best ensilage is produced from corn that has been drilled and not broad casted. Every stalk of corn should be grown so that it has plenty of soil room in which to develop its roots, plenty of rich soil to draw nourishment from, plenty of air-breathing space, and plenty of sunlight falling directly upon all of its leaves. The immaturity of closely growing corn depends more upon its lack of sunlight than upon any other cause.

Prof. Roberts (Cornell experimental station, New York, 1888) valued as follows :

One acre of hay	$18 00
" broad casted corn..................	19 72
" drilled corn.........................	35 74

4. *State of Maturity.*—This is controlled greatly by method of growing. Prof. Roberts, following out his experiments as cited above, says :—"From the above facts it will be seen that the real feeding value of the corn increased 166 per cent. after it had tasselled out, and 80 per cent. after it had nearly reached the roasting ear stage. This being so the greatest care should be taken to select those varieties of corn intended for ensilage that will fully mature before frost, in the localities where it is proposed to grow them."

Bulletin 9, 1889, Missouri experimental station, discusses the life-history of corn and contains this among many important statements, "The considerable increase between September 10th and September 17th (amounting to 24 per cent. of the total weight) indicates clearly that a crop of corn should remain in the field as long as possible, the weather permitting, to reach its greatest perfection."

Mass. Report for 1885 says, (p. 53) "One ton of green fodder corn in tassel contained in one case 307.2 lb. of dry vegetable matter; whilst in the case of the seed just beginning to glaze 463.8 lb. of dry vegetable matter are found in one ton,—a difference of 156.6 lb. in favor of the more matured state of the growth."

Mass. Report for 1886, "The ensilage of a more matured fodder corn has a higher feeding value pound for pound, compared with that cut at an earlier stage of growth."

Other experiments might be referred to, the general conclusion is that for *quantity and quality* of corn and ensilage the plants should be grown in drills and allowed to grow until the kernels begin to glaze. So long as a plant is increasing in height there will be little sugar or starch accumulated in its stalks or leaves, its compounds will be principally in a state of translocation, in a soluble form liable to easy change.

In 1884 Dr. A. Voelker, F.R.S., addressed the Royal Agricultural Society as follows:—"I feel compelled, however, to say at once that a careful and critical study of the literature of the subject, and attentive perusal of most of the original publications on ensilage in England, America and the Continent, have shewn me how scanty and imperfect is our knowledge of the complicated processes of fermentation and of similar chemical and physical changes to which succulent green food is liable under various conditions of temperature, the total or partial exclusion of atmospheric air or its free admission."

The same can be repeated with equal truthfulness in the year 1890. The changes taking place in the silo are principally changes that are classed as fermentations, and the latest English, French and German investigations of fermentations leave us in much uncertainty as to their nature and conditions. From the conflicting opinions and the varying results I have selected a few results that are the unmistakable outcome of a large range of experiment and experience.

1. *Loss.*—There is a loss of valuable plant material due to the chemical changes taking place in the silo. It will vary from a very small per cent. to one-half of the dry material of the corn. The loss will depend upon the condition of the corn placed in the silo and the fermentation taking place. The substances lost or used up will be in the following order:—Sugar, starch, fibre, nitrogenous compounds. The distinction of these constituents will be accompanied by the production of acids (carbonic, lactic, butyric, acetic, etc.), so that the acidity of silage is a fair test of the loss sustained, and the production of as sweet a sample as possible is both advantageous and economical.

2. *Production of Acid.*—We have just stated that this is carried on at the expense of the most valuable portions of the corn. The difference between sweet and sour silage is one of degree of acid, varying in sweet ensilage from .02 per cent. to .50 per cent. of acid to 2.0 per cent. or over in sour ensilage.

Now let us look at some of the conditions controlling acid production, for in understanding them and following out their conclusions lies the difference between sweet and sour, good and poor ensilage.

(*a*) *Water.*—Ordinary fermentations are carried on in solutions, in presence of water. Matured grains, straw, well-cured hay, succulent foods thoroughly dried, manure deprived of all of its moisture will not ferment. Even concentrated solutions ferment but slowly. It would seem that when the plant is young and succulent when the amount of water rises much above 75 per cent. that the cells are in their most favorable water condition for fermentation. Water is not only a favorable medium in which the fermenting cells develop most vigorously, but is also demanded for many of the chemical changes, many fermentations being processes of hydration. To retard acid formation therefore, save loss of food, and make sweet ensilage the material put in should not be too succulent.

Conclusion.—For sweet silage use well-manured, or partially dried and wilted corn.

The amount of water in the corn depends upon the state of maturity, the method of growing and the treatment at harvesting.

CORNELL EXPERIMENTAL STATION, DECEMBER, 1888.

Period.	Date of Cutting.	Per cent. Water.
I	July 24	89.34
II	Aug. 8	83.57
III	Sept. 3	73.93

"It will at once be seen that the most marked difference in the composition of the fodder cut at the different periods consists in the constant and rapid decrease in the amount of water."—(Prof. Roberts.)

MASSACHUSETTS EXPERIMENTAL STATION REPORT, 1885, p. 52.

FODDER CORN AT DIFFERENT STAGES.

—	July 22.	July 29.	Aug. 5.	Aug. 3.	Aug. 27.	Sept. 3.
Water	88.61	85.76	84.64	82.08	81.15	76.81
Solids	11.39	14.24	15.36	17.92	18.85	23.19

The crowding of corn together also has the effect of retarding growth and maturity, and, in most cases, of increasing the water per cent.

ONTARIO EXPERIMENTAL DAIRY DEPARTMENT, 1888.

Drilled corn, 81.32 p. c. water broad casted corn, 83.61 p. c. water.

In favorable weather wilting upon the ground will have the effect of reducing the water per cent. and also of effecting changes (as many advance) similar to hay making or curing.

(*b*) *Condition of Maturity.*—"The marked increase of nitrogen free extract (members of the starch family) as the corn matures, and the progressive decrease of acid in the ensilage, show how greatly the corn improves as it approaches ripening. The relatively large amount of water and crude fibre in the young plant justifies the epithets 'slush' and 'swill' as applied to the ensilage from such material." (Michigan Experimental Station Report, 1889). This statement accompanies a table of analyses of ensilage from which the following is taken :

No. 1,	Aug.	25, wilted two days, then ensiled,	1.10	per cent.	acid.
" 2,	"	27, put in fresh,	1.02	"	"
" 3,	Sept.	1, wilted two days,	0.95	"	"
" 4,	"	3, put in fresh,	0.91	"	"
" 5,	"	8, wilted two days,	0.87	"	"
" 6,	"	10, put in fresh,	0.80	"	"
" 7,	"	13, put in fresh,	0.81	"	"

September 14, killing frost.

Prof. Henry, of Wisconsin, says, "In regard to making the so-called sweet ensilage the main point appears to be to have the corn well ripened, ready for early cutting and shocking. Corn ripened so that the grain begins to dent will make sweet ensilage even if the silo is filled in a single day."

The more matured a plant, the more fixed, less changeable are its constituents, *i. e.*, the constituents of a young plant will suffer change or decomposition more rapidly than those of the same plant more matured.

(*c*) *Temperature.*—Mr. George Fry, of England, in his work "Sweet Ensilage," laid great stress on the necessity of raising the ensilage to 122° F., thereby to stop the various ferments. The most favorable temperature for the development and working of the various ferments is about 95° F., and most of them cease at 122° F., but some continue active to 140° F. Fry says that excess of water in succulent food prevents this rise of temperature and that sour ensilage thereby results, as the ferments are not then destroyed.

In opposition to Fry, Prof. Alvord, of Maryland Experimental Station, says, "Temperatures 110° to 140° F. are most favorable for their development and activity, and it requires at least 185° F. to destroy them, while fermenting ensilage does not often exceed 140° F., and no authentic record of 150° F. can be found."

Along the same line Prof. Johnson, of Michigan, says, "I am of opinion, however, that positive evidence to sustain this theory is almost if not entirely wanting. Enough careful work has not been done to demonstrate it beyond question."

Amid conflict of opinions I think that, taking the conclusions of scientific experts as our guidance, we are warranted in the conclusion that though we cannot expect to raise the ensilage to such a temperature as to cause all ferments absolutely to cease work, nevertheless we can retard greatly their action and control somewhat the souring of the ensilage. There is along this line room for investigation on the part of our interested young agriculturalists of a scientific turn of mind.

(*d*) *Method of Filling.*—Whether slowly or rapidly, whether wilted or unwilted, this will be partly controlled by the weather, but there seems to be something of more controlling influence back of this. The effect of the method will perhaps have more effect on the aroma or flavor of ensilage than upon its acid production.

(*e*) *Exclusion of Oxygen.*—Presence of air is of course necessary for the beginning of many of the fermentations, but, once commenced, absence of air will not necessarily destroy them. The exclusion of the air is of most importance in the case of ensiling young and succulent fodder.

3. *Effect on Protein.*—This is the muscle and flesh forming portion of the plant, hence the effect on it is worth considering. Michigan Experimental Station, Bulletin 49, May, 1889, states, "A small loss of crude protein is common in the silo, but the change from albuminoid to amide condition of the nitrogen compounds is the most striking feature of ensiling. These two facts point to a loss of value in ensilage as compared with the fresh corn stalks, or even the dry material when it has been rapidly and perfectly cured."

The same conclusion was arrived at by Dr. Voelcker in '86-'87, and reported upon to the Royal Agricultural Society of England, Report XLVI, p. 403. Silage was made from grass and compared with hay from the same. "The total loss due to fermentation, evaporation, etc., in making the silage was 7.29 per cent. on fresh grass, of this 3.25 per cent. consisted of water. The loss of total nitrogen when, as here, no drainage is allowed to flow away, is very slight; but the nitrogenous bodies have undergone considerable change from the albuminoid to the non-albuminoid condition. The woody fibre, as indeed the whole of the fibre, has been diminished, insoluble albuminoids are lessened, and the soluble albuminoids increased. In the hay the nitrogen has undergone but little change."

Put in silo 151 lb. (n. compounds), 123 lb. alb'd, 28 lb. amides.

In silage 155 lb. (n. compounds), 73 lb. alb'd, 82 lb. amides.

The most extensive tables of analyses of American fodders are those compiled by Dr. Jenkins of Connecticut. The table below gives his average of 59 samples of ensilage and the maximum and minimum amounts of the various constituents. To his table I have added 41 analyses, gathered lately from a wide range of reliable sources, and give the average of 100 samples that I thus obtained :—

——	Water.	Crude Protein.	Fat.	Soluble carbo-hy-drates.	Crude Fibre.	Ash.
Maximum	87.00	2.80	1.80	22.30	10.00	
Minimum....................	64.40	0.70	0.20	5.10	3.00	
Average, 59 samples...........	80.28	1.52	0.70	10.49	5.70	1.31
" 100 "	79.83	1.56	0.73	10.62	5.94	1.29

Water.—The water varies from 64.4 to 87.0 per cent. From our investigations it appears that the best, the sweetest, and the greatest amount of ensilage will be produced when the amount of water lies near 75 per cent., between that and 80 per cent.

Crude Protein.—In food analyses, this of course includes the less valuable amides, which are not flesh and muscle formers, but heat producers. The following table gives a few analyses separating the true protein from the amides or non-protein. I have said before that in the silo true protein will be changed to amides to a certain extent ; this, in addition to the amides always existing in young growing plants, will give us a high per cent. of non-protein :

——	Total crude protein.	True protein.	Amides or non-protein.	Per cent. of true protein.	Per cent. of non-protein.
New York, 1886.........................	0.85	0.50	0.35	58.83	41.17
" "	0.85	0.45	0.40	52.95	47.05
" "	1.08	0.75	0.33	69.45	30.55
" "	1.17	0.73	0.44	62.40	37.60
Wisconsin, 1888	1.92	0.99	0.93	51.58	48.42
Dr. Voelcker, 1884.....................	1.12	0.68	0.44	61.10	38.90
Pennsylvania, 1889....................	2.15	1.43	0.72	66.52	33.48
" "	2.35	1.75	0 60	74.47	25.53
" "	2.43	1.98	0.45	81.48	18.52
" "	2.34	1.60	0.74	68.42	31.58
Michigan, 11 analyses, 1889............	1.32	0.82	0.50	62.12	37.88
Average..................................	....	....	....	63.36	36.64

German investigators have found non-protein in considerable quantities in roots, potatoes, malt sprouts, and fodder plants of all kinds, the average in the last case being about 30 per cent. In four analyses of malt sprouts Kellner found an average of 27.40 per cent. (Armsby). The average so far found in corn ensilage is in excess of that usually found in the freshly gathered plants, and this large quantity of non-protein, to a certain extent, takes from the value of the ensilage and demands a liberal addition of nitrogenous foods to it to make complete rations.

Fat.—There is little or no true fat in corn ensilage, unless it be made from corn well matured. The fat represented in our tables is ether extract more properly and consists largely of chlorophyll, waxy matters and acids. The amount of fat, therefore, may be considered as of little or no value.

Much difficulty meets us here ; there are few determinations with wide differences. I give the digestion co-efficients available :

——	MOSER. (Germany.)	ARMSBY. (Pennsylv'a)	WOLL. (Wisconsin.)	STURTEVANT (New York.)
Protein	73	41	78	49
Fat	75	86	53	90
Carbohydrates	67	66	56	67
Fibre	72	60	74	69

Reference to the reports of work done at some U. S. stations, especially at Wisconsin and Pennsylvania during the past two years, clearly shows that there is good work to be done in determining the exact feeding value of corn ensilage in comparison with corn fodder. Some contend that ensiling lowers the digestibility of some portions of the food, fibre for instance. The variability of results arising from variety of methods adopted to determine this leaves the question as yet to be settled.

——	Water.	Protein.	Fat.	Soluble carbo-hydrates	Fibre.	Ash.	Nutritive ratio.
Colostrum	71.7	20.7	3.4	2.5		1.8	1:0.5
Whole milk	87.0	4.0	3.7	4.6		0.7	1:3.3
Grass	75.0	3.0	0.8	13.1	6.0	2.1	1:7.0
Corn ensilage	79.8	1.6	0.7	10.6	6.0	1.3	1:11.0

Nature's feeding is from colostrum to whole milk to green grass. By consulting our table we see that corn ensilage is alone not sufficient to take the place of either whole milk or good pasture grass, that the great lack is in nitrogenous constituents, flesh and muscle formers, and that the use of ensilage in a ration demands the addition of foods containing protein and fat, such as good hay, grain, bran, cake, in such proportions as must be regulated by the circumstsnces of the feeder and market prices. Let us now contrast the ensilage with the German feeding standard for milk production, which is the best established of the standards. Though these standards cannot be closely followed in this country, they will serve to show the great lack in the ensilage for milk production which must be supplied as above stated. I take the highest digestible co-efficients (Moser's)

——	Organic substance.	Digestible Substances.				Nutritive ratio.
		Protein.	Carbohydrates	Fat.	Total.	
German standard for milk	24.0	2.5	12.5	0.4	15.4	1:5.4
120 lb. of corn ensilage	24.2	1.4	13.7	0.5	15.6	1:10.1

Thus it would require 120 lb. of ensilage per 1,000 lb. live weight, daily, to give organic substance equal to that demanded by the German standard. The two noticeable features are, the lack of protein and the great mass of ensilage. The general conclusion of the American experiments is that in profitable feeding the daily allowance will not exceed 50 lb.

In conclusion, let me state requirements met by the ensilage :--1st. It is succulent and palatable. 2nd. It gives bulk for ruminants. 3rd. It contains heat and force producing constituents. 4. It may contribute somewhat towards fat production. 5th. It should, pound for pound, a little more than take the place of roots. 6th. It is regulating and tonic in its effects upon the animal system.

CHEMISTRY OF DAIRY PRODUCTS.

By A. E. Rennie, of Hamilton.

In examining the composition of blood and milk the large amount of water they contain, is at once noticeable, there being in the maximum only 15 per cent of solids.

Empires like milkmen have risen to greatness, in proportion to their water privileges. In the case of the milk dealer, however, it is often in the inverse ratio, in relation to true greatness.

What would Egypt, Greece or Italy have been without the grand water highways which surrounded and penetrated them? The mighty rivers and the great lakes of Canada were the cause of her rapid immigration and advancement.

Men follow, nature leads.

Man found water a more convenient freight bearer than land, and therefore used it as a travelling route.

He found water a good heat conveyer, and therefore boasts of the hotwater system of heating.

Long before the first ocean grey hound crossed the intervening water, the pioneer voyageur ran a rapid, or a Roman galley left the Tiber, nature used water as a freighting medium.

Stratified rock exemplifies how materials were disintegrated, floated, precipitated in ages past.

The rounded boulders in our fields shows us that all things need recreation.

The Scotchman can point back to these monuments of glacial action, as proof that curling is the most ancient of games, nature having introduced the sport in ages past.

The avenues of the work of water are not to be found in this organic world only but are exhibited in the water vascular system of the lowest echinoderm and the circulatory system of the highest vertebrate.

The whole organism is a sea port town, and like a double track railway there are separate ways for incoming and outgoing cargoes.

At the lacteal vessels the blood is freighted with dissolved nutritive substances from the food. At the "long port" the little blue incoming boats discharge their heat giving material, and take in oxygen, thus becoming red vessel outward bound. Every hundred volumes of blood carries twenty-two volumes of oxygen.

Look at the circulation of the blood : Can any engineer propose or put in execution a process of heating better than this old plan.

Don't brag of the discovery of the hot water system of heating, it is as old as the vertebrates.

Water of the blood and milk depends for its purity upon the source from which it is obtained. If water is obtained from fermented, or putrid food, it will contain germs that will originate fermentation. I canvas not your opinion, gentlemen, whether you are pessimists, and believe life is degenerating, or whether you believe in the survival of the fittest and that the organic mechanism is still making upward strides; but simply state that if you expect a cow to act as a successful garbage filter; you have overestimated cow nature, for the milk product will contain the ferments of putrefaction and disease.

The person who is not political economist enough to believe in division of labor, to the extent, that the man who delivers milk and the man who collects garbage from his yard should not be one and the same man, has missed his calling in life, for he should travel and see the world. Yes! See the world with Barnum.

A dairy farm drew water from a certain pond; within 22 paces of the same pond at a higher level a ditch ran in which a sewer from a village discharged its contents. The result was that diphtheria broke out in the village, the attacks and fatal cases being in the families of the customers of this dairy farmer.

A bad epidemic of sore throat was clearly traced to the prevalence of this disease among cows in 1883 in Dover, England. Four hundred cases of sore throat occurred in a week among the customers who received milk from the diseased source. Authentic evidence shows that water from a diseased origin is dangerous.

The fat of milk is complicated as to its constituents being composed of a mixture of a number of hard and soft fats. The specific gravity of this fat at 100° F. is from .912 to .914 the melting point being 96.4° F. The specific gravity and melting point of milk fat changes to some extent according to the nature of the food the animal consumes while producing the milk. Some believe that in the elaboration of milk, the fat is given off from the gland follicles by a process of budding. I don't say it laughs and grows fat. Half such an undertaking is enough.

It was naturally supposed that the fat in milk was derived from the fat of the animal's food; but investigation has proved that the fat in the milk exceeded the fat in the food.

Opinion is likely to run to extremes; the prevailing idea at the present time, being that the fat of the food is used up in producing force and heat, and is therefore not identical with the fat in milk.

Fat stored up in the body receives its character from the food producing it. Pigs fed on oily nuts, mast, etc., exemplifying this fact, the flesh being oily and unfirm. Experimenters have come to the conclusion that a high per cent. of oil in food depresses the activity of the milk gland. This might be due to too great a change in the food, the animal showing different results if educated up to the extreme change. It is a well-known fact that the emulsification of fat in the body is produced by the bile; and that a too rapid increase of fat in the food is liable to be followed by an excessive secretion of bile, causing biliousness. The consequence of this being that the system would be disturbed, and the production of milk interfered with to some degree. The fact that northern cows cannot stand being fed on the crude cotton seed, while southern cows can eat it in considerable quantities, may be due to the amount of oil it contains, its high per cent. of albuminoids, or the medicinal effect of the cotton plant itself.

The melting point of butter from milk of cows fed on cotton seed is remarkably high, while cotton seed oil solidifies only when cooled near the freezing point of water. This would indicate that the fat in the milk was due to the albuminoids of the cotton seed and not to the oil it contained.

The size of the globules of emulsified fat has an important bearing upon the creaming of milk. The large globules of the Jersey and Guernsey allow the milk of these breeds to show at their best, the per cent. of churning butter being large, on account of the ease with which the large butter globules rise through the milk. The Ayrshire and Holstein breeds are at a disadvantage, on account of the butter globules being small. This milk requires more skill to extract as butter as large a per cent. of the fat present in the milk.

When we commence to study milk under this heading we are struck with the wonderful provision nature has made for the development of off-spring. Starting from the blood, we note the great changes exhibited between it and the colostrum (or first milk), and between this and normal milk. In the colostrum, there is ten times more fat than there is in the blood serum. The young animal requiring heat producing food, to keep up the temperature of the body. In normal milk there is an increase of twenty-two times as much fat as in the blood, that being twice as much as in the colostrum. The calf on account of its active life requiring a force producing food. This is where nature and the boy that took the calf to the market disagreed. The calf was on one end of the rope and the boy on the other. The calf would go ahead at a rate that made the boy think it was competing with an express train, then it suddenly stopped and the boy sat down as suddenly. The boy thought the animal had too much energy and certainly didn't need food to produce it.

Mr. E. Smith of N. Y., who has written on food, says "that ten grains of butter burnt in the body, produces heat sufficient to raise 18.68 lbs. of water 1 ° F."

Prof. Atwater says, "that if 1-28 of an ounce of fat is consumed in the body, it will (if it be transformed into mechanical energy such as the steam-engine or the muscles use to do their work), furnish as much as would raise one ton fourteen and two-tenths feet, or 14 2-10 tons one foot. Mr. Zavitz suggests that the fat must have been strong."

The fat in milk does not saturate the other solids. If such was the case, the fat would prevent the solids being acted upon to any advantage by the juices of digestion; but the facts are just opposite, for the fat is presented in the milk in the form of an emulsion, ready to be passed into the circulation.

There is less than five per cent. of sugar and extractives in the blood. In colostrum there is 1.34 per cent. which realized three times as much as in the blood; and normal milk contains ten times as much sugar as the blood. The reason of this increase is to supply heat and force giving material equal to the demand in calf life, occasioned by its prominent characteristic, namely—activity.

Milk is the only known substance that contains sugar in the form of lactose.

Milk sugar is remarkable for its grittiness, its lack of sweetness, and its power of resisting the attack of certain ferments among which is the *butyrie facillus.*

The effect of milk sugar to the dairyman is of great moment, indeed, it is the highway of friend and foe.

Ferments may be conveniently divided into two classes:—1st. *Pathogenic* (disease producing) and, 2nd. *Non-pathogenic.*

In speaking of the *non-pathogenic* ferments, it is convenient to divide them into two classes, those that develop in a neutral or alkaline solution and those that require an acid medium in which to increase.

It is known that there are from 30 to 40 *non-pathogenic* species of *bacteria* that grow, and produce certain changes in milk and cream.

It is a common practice in farm life, to subdue weeds by crowding them out, by keeping the land covered by some economic crop. Buckwheat is often used for the purpose indicated above, because it covers the ground with a luxuriant growth, and because its roots seem to have an antagonistic effect on other plant life. The dairyman in producing butter and cheese uses certain ferments for a similar use. The ferment that produces the ordinary souring in milk, is called "*Bacillus acide lactici.*" It is the most commonly known of all the ferments in milk and cream. It produces its action by attacking the milk sugar and converting it into *lactic acid.* It multiplies best in a neutral or slightly alkaline solution. Its growth is slow in a dilute acid solution and is prevented entirely when the acid is increased to .8 per cent. On account of the above fact only a portion of the sugar in milk can be changed to acid. To the unskilful butter and cheese-maker, the *lactic* ferment is the personification of all evils; while to the scientific and painstaking it is a friend at all times. The *butyric bacillus* is the dread of the butter-maker, for to it is attributed the condition prevalent in 10c. butter. This ferment cannot increase the presence of free *lactic acid.* The cheese-maker knowing that the ferments which produce this effect known as "ripening" in cheese increase but slowly in the presence of *lactic acid*, manipulates the curd in such a way that it will retain just the proper amount of acid. The consequence being that there is a very gradual change due to certain ferments that have the power of making the *albuminoids* more soluble, and consequently more digestible. If the cheese-maker is unskilled and allows too great a development of *lactic acid*, before he draws off the whey the curd will be hard and dense, digestive fermentation impossible ; and the resulting cheese will be heavy, wanting that porosity and rich cheesy smell that characterises marketable cheese.

The ash of milk is composed of phosophates of iron, potash, lime and magnesia ; and chlorides of soda, potash and lime. The coagulating action of rennet on casein, will only take place when the neutral phosphates are present. The ash in colostrum is nearly double that in normal milk. This being necessary to satisfy the needs of the calf whose bony tissues need ash constituents.

There are three main classes of albuminoids in milk, albumen, casein and fibrin.

The albumen in normal milk is about one-fifth of the casein present. In the colostrum it is increased to the extent that it reaches 60 per cent. of the total solids present. Albumen will not coagulate under the action of rennet or acid, but is coagulated by heat. It is closely identified with blood albumen ; there is less of it in the blood than in normal milk, however. Nature seems to increase it in the colostrum for the purpose of medicine and on account of its fine division to give the juices of the stomach a better chance of action during the period of its first secretion of digestive juices.

The viscosity of milk is largely due to the albumen, and nature has produced it for the very reason that dairymen wishes to get rid of it.

Nature has for its object the presentation of milk in a form that could be best acted upon by the digestive system, therefore milk was made viscose to prevent the fat globules from clustering, and by massing interfere with the easy digestion of the other solids, and also necessitate a secretion of bile to again emulsify this fat before it passes into the blood.

The dairyman on the other hand wishes the fat to cohere and thus become larger in its globules so that the creaming will be more rapid. There is a point for discussion here, therefore the cheese or butter maker does not want fibrin in the milk, the butter maker for the reason about creaming. The cheese-maker would appear to want it to keep as much fat as possible held on the solids of milk, but another fact comes in here. The albumen would coagulate with rennet, but on coagulating with heat it produces difficulties in cheese manufacture and even after manufactured it leaves the cheese so open to the attack of ferments, that the cheese changes rapidly and is anything but what would be termed " of good shipping quality."

Casein, by the best authorities, is said to be manufactured from the albumen of the blood. The reason for coming to this conclusion, is that when by disease or excitement the body is thrown out of its normal condition, the casein is greatly diminished in the milk and albumen predominates.

Albuminoids in the form of casein are present in no other substance than milk.

Casein of human milk coagulates in a very fine state, producing much surface to the attack of the juices of digestion. The casein of cow's milk coagulates in mass, holding the globules mechanically. The smaller the globules of fat the easier they can be held by the curd, and the fewer of them will escape from it, so that Holstein and Ayrshire milk is well adapted for cheese making. The casein holds the phosphate of lime in true combination. The late Prof. Arnold held that if the curd was left too long before the whey was withdrawn, the phosphate became separated from the casein. The cheese losing in weight and food value that valuable ash constituent.

It is the opinion of the best authorities that fibrin does not exist in the normal blood previous to its being shed, but is the result of the union of fibriogen and paraglobulin.

These compounds may, with proper management, be precipitated from the blood without union. The coagulation of blood is due to the formation of fibrin, which encloses the blood corpuscles in its net work of threads.

Blood contains 2.2 to 2.8 parts of fibrin in the 1,000.

Coagulation is promoted by—

1. Exposure to air.
2. An increase of temperature slightly higher than the living body.
3. Contact with foreign substance.
4. Agitation.
5. Addition of minute quantities of common or other neutral salt.

Coagulation is delayed by —

1. Cold.

2. Certain chemical reagents in sufficient quantity. Among these are common salt, caustic alkalies, magnesium sulphate (epsom salts), potassium nitrate (saltpetre).

Dr. S. M. Babcock of the Wisconsin Agricultural Experimental Station, has made some very valuable investigation in regard to fibrin.

In Bulletin No. 18, it is stated that milk contains fibrin to the extent of about 1-500 of that in blood, or two or three parts in every ten thousand of milk, the fat in the whole milk.

Cream 99.3 per cent. fat of milk. Skim-milk 7 per cent. fat of milk.

If the milk is not quickly chilled with ice water fibrin will form rapidly, so that in thirty minutes the milk be in such a condition on account of the formation of fibrin, that if it then be immersed in ice water at 40° F. it will only yield up fat as follows :—

Cream 91.2 per cent. fat of whole milk.

Skim-milk 8.8 per cent. fat of whole milk.

Contrasting this with the other method of rapid milk setting, *there is a loss of 8.1 per cent. of fat.*

This necessitates a loss of 8.1 per cent. of the butter made by the farmer, resulting in *a loss of 8.1 per cent of cash for* butter that could have made.

When there is such a cry "that farming does not pay," it is worth while to use better methods of work. In this one case for the butter.

It is contended that fibrin in milk is in the form of a network of interlacing particles, as in blood, and that the creaming of milk is retarded by the fat globules being caught in the fibrin, an impediment in the rising of the fat being caused to such an extent that almost all the fibrin is carried up into the cream layer ; the result of the above being that the cream raising is slow and a quantity of small fat globules never reach the top.

This fact is exemplified by experiments and in practice from Prof. Henry's investigation (Wisconsin exp. station), and from results of daily practice in actual dairy work it is shown that if normal milk in gun shot cans be immersed in ice water at 40° F. directly after it is milked (say while at 90° F.) the result attained shows that the farmer has a chance to increase his output in butter 8 per cent. Business men consider 8 per cent. a very good interest.

Experimental stations and such unions as this, gentlemen, have the high honor of investigating and bringing forward improved methods, and I believe the present depression in farm life is not to be looked upon with despair. It is "a dark cloud with a silver lining," which will force the ignorant, careless and timid to strike out for more knowledge. The institutions of agricultural education will be recognised in their true merit, and the farmers of Canada will press for more and more research in regard to the unknown in the field and the dairy. The conclusion of the whole matter being that the Canadian farmers will supply Canadian markets, and cope successfully in supplying the foreign, especially the British market.

HORTICULTURAL EXPERIMENTS.

The following report is a synopsis of the experiments in potato culture for 1889, showing in a concise way the results obtained by the different persons who undertook the work. The committee deemed it advisable to leave out No. 3, small, eyes cut out but one, and No. 4 medium, cut in two, as there was a loss of time in preparing the former, and an extravagance in bulk of seed. The following circular was sent to experimenters, together with a blank form for report .—

GUELPH, April 5th, 1889.

DEAR SIR,—It has been decided by the Horticultural Committee of the Ontario Agricultural and Experimental Union to carry on the following experiments with potatoes. We shall be pleased if you will conduct these experiments and report results.

No. 1. planting large whole potatoes.
" 2. " small uncut potatoes
" 3. " medium potatoes, fresh cut, 2 eyes.
" 4. " " " old cut, (5 days), 2 eyes.
" 5. " " " cut, with 1 eye.
" 6. " " " seed ends.
" 7. " " " fresh cut, 2 eyes, cultivated flat.

Nos. 1 and 2 to be planted 20 inches apart in rows. Nos. 3, 4 and 5 to be planted 8 inches apart in rows. Plant that variety which does best with you. Potatoes to be planted on 6 adjoining rows, where land is uniform. Give same manure and cultivation as rest of the field. Each row to be 7 rods long. In digging be careful to weigh accurately, and forward results as soon as possible to

N. J. CLINTON, Windsor, Ont.

Report at earliest convenience if you will undertake the work.

ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION.

	Answers.	No. of Row	Weight of crop lb.	No. of lbs. small potatoes under $1\frac{1}{2}$ inches in diameter.
Give date of planting.......				
" date of digging.......				
" Crop in 1888..........				
" Crop in 1887..........				
" Weather..............				
" Variety.............				
" Surface Soil..........				
" Subsoil...............				
" Distance between rows.				

What is your usual way of preparing seed for planting?..
How do you cultivate your potatoes?..
Name..P. O..

The following are a few conclusions we can draw from this and the preceding report for 1888:—

1. That there is not any advantage in keeping potatoes cut for seed any length of time before planting, for in both cases the returns are less than from the fresh planted seed.

2. The planting of the large whole potato 20 inches apart in rows gave better results then when planted 12 inches apart.

3. A person not having time to cut his potatoes will not lose anything by planting them whole, especially large and medium sized potatoes, for they gave returns of 43.2 bushels more of large or marketable potatoes than any of the six rows and 29.6 bushels more potatoes than any of the six rows after the seed was deducted from the total yield, No. 6 being the next highest.

4. No. 4 gave second greatest yield of marketable potatoes out of six rows, No. 6 second, No. 2 3rd, and No. 5 4th.

REMARKS.

The additional experiment No. 7 was added on after the plan of the experiments was printed and only three tried it, and as two of the three experiments gave the heaviest returns it would not be fair to deal with it among the averages, but only as the three individual experiments. One reported the sample as extra large.

The light yield as compared with that of 1888 was largely owing to the early wet season followed up by a long spell of dry weather in most localities during the season.

J. HOYES PANTON, }
ELMER LICK, } Committee.
N. J. CLINTON. }

RESULT OF POTATO EXPERIMENTS FOR 1889.

Experimenters.	Variety of Potato.	Large w			Small uncut.			Fresh cut, 2 eyes.			Old cut (5 days) 2 eyes.			Cut with 1 eye.			Seed ends.			Two eyes. (fresh cut) flat cultivation.			Average seven kinds.		
		1.			2.			3.			4.			5.			6.			7.			—		
		Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.	Lar. lb.	Sm. lb.	Tot. lb.
J. H. Esplin........	Early Rose........	65	30	95	42	26	68	39	20	59	28	7	35	43	14	57	32	21	53	....	....	....	41.5	19.6	61.1
Elmer Lick.........	White Elephant	34½	17½	52	29½	12	41½	31	11	42	31	14	45	23½	9	32½	14½	9	23½	32	7	39	28	11.3	39.3
Isaac French	....	155	20	175	115	15	130	73	9	82	68	12	80	87	14	101	83	17	100	91	21	112	96	15.4	111.4
Edgar M. Zavitz....	White Elephant	52	18	70	47½	7	54½	45	5	50	43	6	49	....	....	....	....	....	....	....	....	....	46.8	9	55.8
George G. Sherriff..	Early Rose..	44	6	50	54	8	62	62	7	69	29	4	33	40	5	45	76	12	88	....	....	....	50.8	7	57.8
R. C. King.	Late Rose..	38	25	63	18¾	16½	35¼	13¾	21½	35¼	18¾	29½	48¼	19¼	19¼	38½	21½	25	46½	..	..	..	21.6	22.7	44.3
Jas. Forsyth......	Beauty of Huron...	192½	9½	202	72	13	85	173	12	185	96	9	105	108½	8½	117	128½	10½	139	114	9	123	126.3	10.2	136.3
Average yield one row (7 rods).......	....	83	18	101	54	13.9	67.9	62.3	12.2	74.6	44.8	11.6	56.4	53.5	11.6	65.1	59.2	15.7	74.9	79	12.3	91.3	58.7	13.6	72.3
		Bush.			Bush.			Bush.			Bush.			Bush.			Bush.			Bush.			Bush.		
Average seed used per acre..... ..	.... 1889..	33.2			8.7			14.4			14.4			8.2			8.2			14.4			14.5		
	1888..	55.5			14.4			14.4			14.4			8.2			8.2			....			19.1		
Average yield per acre........... ..	.... 1889..	212.1			142.8			156.7			118.4			136.7			157.5			190.7			159.3		
	1888..	263.9			216.0			213.9			209.1			197.3			207.4			....			220.6		
Net yield per acre (less seed).... ..	.... 1889.	178.9			134.1			142.3			104.0			128.5			149.3			176.3			144.8		
	1888..	208.4			201.6			199.5			194.7			189.1			199.2			....			201.5		

SECOND DAY'S PROCEEDINGS.

The nominating committee presented their report, and the Association elected the officers for 1890–91, which were as follows.

OFFICERS FOR 1890–91,

Hon. President, Prof. T. Shaw, O. A. College, Guelph.
President, T. G. Raynor, B. S. A., Rosehall, Prince Edward County.
Vice-President, J. J. Sinclair, Ridgetown, Kent County.
Corresponding-Secretary, G. A. Brodie, Bethesda, York County.
Secretary-Treasure, A. Shantz, Waterloo, Waterloo County.
Editor, C. A. Zavitz, B. S. A., O. A. College, Guelph.
Auditors—J. A. Craig, B. S. A., Toronto; H. H. Dean, O. A. College, Guelph.

DISTRICT SECRETARIES.

District No. 1, comprising Stormont, Dundas, Russell, Glengary, Prescott, Cornwall, Carelton and Grenville, W. E. Serson, Antrim.

District No. 2, Lanark, Renfrew, Leeds, Frontenac, Lennox, Addington, Hastings and Prince Edward, T. Raynor, Rosehall.

District No. 3, Nipissing, Parry Sound, Muskoka, Haliburton, Peterborough, Northumberland, Durham, Victoria and Ontario, G. B. Brodie, Bethesda.

District No. 4, Simcoe, York, Peel, Dufferin, Grey, Wellington and Halton, H. B. Jeffs, Bondhead.

District No. 5, Wentworth, Lincoln, Welland and Haldimand, H. L. Hutt, South End.

District No. 6, Waterloo, Oxford, Brant and Norfok, A. Shantz, Waterloo.

District No. 7, Huron, Perth and Bruce, N. Monteith, Fairview.

District No. 8, Middlesex and Elgin, W. A. McCallum, Ailsa Craig.

District No. 9, Essex and Kent, N. J. Clinton, Windsor.

District No. 10, Lambton, A. E. Wark, Wanstead.

COMMITTEE ON EXPERIMENTS.

Agricultural—Profs. James, Shaw and Robertson, Messrs. C. A. Zavitz, J. Harcourt E. A. Rennie, N. Monteith, W. A. McCallum, and H. L. Hutt.

Horticulture—Prof. Panton, N. J. Clinton and E. Lick.

Agriculture—R. F. Holtermann and A. E. Rennie.

Dairying—Prof. Robertson, G. Harcourt and A. E. Rennie.

Live Stock—A. E. Wark, F. G. Sleightholm, J. J. Sinclair, H. H. Dean and Geo. Harcourt.

AGRICULTURAL EXPERIMENTS.

Mr. C. A. Zavitz, Secretary, submitted the following report of the Committee on Agricultural Experiments:—

During the past four years a Committee has been appointed annually by the Ontario Agricultural and Experimental Union for the purpose of making proper arrangements for the conducting of Agricultural Experiments over Ontario. This work has been very carefully done each year by the committee appointed and only those experiments chosen which were considered to be of real practical value to those conducting them, and at the same time to be of such a nature that the results would, when collected together, and printed in the annual report of the Union, afford much useful information. The tests so far have been with grains, fertilizers and corn, and during the past season there has been four distinct experiments conducted over the Province. The carrying on of this work is not now confined to the ex-students of the college alone, but a number of other leading farmers over Ontario have also joined the ranks, and both the number of experiments and of experimenters is increasing annually. Much interest and enthusiasm is manifested in these experiments, and we think a valuable work is being done.

After the names and addresses of those members of the Union and others who were desirous of conducting one or more of the proposed experiments were obtained, material was sent in sufficient quantities to carry on the tests free of charge to the experimenters. Sheets containing full instructions regarding the detail management of the plots, and blank forms to be filled out and returned to the secretarie at the end of the season, were sent at the same time as the material for the tests. The following is a concise report of the experimental work done the past season.

Two Sets of Plots were fertilised in 1887, and hence this season's crop shows the influence of the fertilisers over third year's growth.

THIRD CROP AFTER APPLICATION OF FERTILISERS.

Fertilisers.	Ontario Experimental Farm, Wellington County.			J. B. Muir, Bruce County.			Average of two lists.	
	Oats.			Barley.			Oats and Barley.	
	Date of maturing.	Yield of straw per acre.	Yield of grain per acre.	Date of maturing.	Yield of straw per acre.	Yield of grain per acre.	Yield of straw per acre.	Yield of grain per acre.
		tons.	bus.		tons.	bus.	tons.	bus.
	Aug.			Aug.				
Salt, 10 lb. per plot (400 lb. per acre)	11	.86	66.8	10	.54	9.2	.70	38.0
Superphosphate, 10 lb. per plot (400 lb. per acre)	13	.76	89.6	14	.68	8.3	.72	49.0
Ground Apatite, 10 lb. per plot (400 lb. per acre)	11	.79	82.6	14	.71	8.8	.75	45.7
Farmyard manure, 700 lb. per plot (14 tons per acre)	15	.99	118.42	14	.84	12.9	·92	65.7
No Manure	14	.92	87.3	14	.68	8.3	.80	47.8

	Fertiliser.	Date of maturity.		Straw per acre (tons) estimated from 1-40 acre plots.			Grain per acre, bush. estimated from 1-40 ac. plots.			Nature of Soil.	Previous cropping.	Name of Experimenter.	County.
		1888.	1889.	1888.	1889.	Av.	1888.	1889.	Av.				
Black Tartarian Oats.	1 Salt, 400 lb. p. ac.	.....	Aug. 15	Undeterm'd	2.02	.....	.....	51.8	.....			Elmer Lick.	Ontario.
	2 Superphosphate, 400 lb. p. ac.	....	" 15	....	1.71	.....	......	60.6	......				
	3 Ground apatite, 400 " ..	....	" 15	....	1.80	.....	.....	58.8	.....				
	4 Freshwood ashes, 400 " ..	....	" 15	....	1.76	.....	......	61.8	.....				
	5 Farm-y'd manure, 14 tons p. a.	....	" 15	....	1.51	.....	......	52.6	.....				
	6 No manure	....	" 15	....	1.60	.....	......	50.6	......				
Black Tartarian Oats.	1 Salt, 400 lb. p. ac.	Aug. 10	Aug. last w'k	Undeterm'd	Undeterm'd	......	18.8	44.7	31.8			Luke Gibbons	Ontario
	2 Superphosphate, 400 lb. p. ac.	" 10	"	....	....	......	16.3	35.9	26.1				
	3 Ground apatite, 400 " ..	" 10	"	....	....	......	12.3	35.6	24.0				
	4 Freshwood ashes, 400 " ..	" 10	"	....	....	......	14.0	35.2	24.6				
	5 Farm-y'd manure, 14 tons p.a.	" 10	"	....	....	......	17.5	42.4	30.0				
	6 No manure, ...	" 10	"	....	....	......	15.3	36.5	25.9				
Black Tartarian Oats.	1 Salt, 400 lb. per acre........	....	Aug. 15	....	1.16	.....	.....	30.6	.....	Low lying.		Lewis P. Hubbs.	Pr. Edward.
	2 Superphosphate, 400 lb. p. ac.	....	" 15	....	1.20	.....	.....	23.5	.....				
	3 Ground apatite, 400 " ..	....	" 15	....	.98	.....	.....	20.0	.....				
	4 Freshwood ashes, 400 " ..	....	" 15	....	.94	.....	.....	21.2	.....				
	5 Farm-y'd manure, 14 tons p.a.	....	" 15	....	1.22	....	.....	35.3	.....				
	6 No manure	....	" 15	....	.96	.....	.....	21.8	.....				
Barley 6-rowed.	1 Salt, 400 lb. per acre........	Aug. 13	July 26	.99	.50	.75	28.80	16.7	22.8	Heavy clay, naturally well drained.	1884, fallow. 1885, fall wheat 1886, clover and timothy. 1887, timothy. 1888, experimented with oats.	R. E. King.	Haldimand.
	2 Superphosphate, 400 lb. p. ac.	" 13	" 26	.74	.45	.60	22.86	15.0	18.9				
	3 Ground apatite, 400 " ..	" 13	" 27	1.04	.40	.72	26.66	13.3	20.0				
	4 Freshwood ashes, 400 " ..	" 13	" 27	.69	.25	.47	19.83	8.3	14.1				
	5 Farm-y'd manure, 14 tons p. a.	" 13	" 26	1.15	.40	.78	31.11	13.3	22.2				
	6 No manure................	" 13	" 27	.95	.25	.60	22.44	8.3	15.4				
Fall Wheat Democrat.	1 Salt, 400 lb. per acre........	Aug. 13	Aug. 1	.52	.40	.46	18.66	12.0	15.3	Heavy clay loam.	1884, hay. 1885, hay. 1886, hay manured. 1887, timothy seed.	Martin Bellerby.	Grey.
	2 Superphosphate, 400 lb. p. ac.	" 13	" 1	.56	.46	.51	16.00	13.3	14.7				
	3 Ground apatite, 400 " ..	" 13	" 1	.56	.44	.50	16.66	12.7	14.7				
	4 Freshwood ashes, 400 " ..	" 13	" 1	.44	.54	.49	14.00	15.3	14.7				
	5 Farm-y'd manure, 14 tons p.a.	" 13	" 1	.42	.60	.51	14.00	16.7	15.4				
	6 No manure..................	" 13	" 1	.56	.50	.53	15.00	14.7	14.9				

1887.—**Results of 27** Sets of Experiments showing the influence of the fertilisers **immediately after application.** The fertilisers were applied at same time as seeding **was done and harrowed in lightly.**

Number of sets of experiments with each kind of grain.	Salt.		Superphosphate.		Apatite.		Farmyard manure.		No manure.	
	Straw per acre.	Grain per acre	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Oats, 13 experiments..............	2844	1441	2806	1474	2716	1448	2612	1480	2502	1396
Wheat, 6 "	2250	900	2194	1020	2290	1007	2605	1116	2020	820
Barley, 8 "	2291	1432	2292	1295	2180	1239	2318	1399	2200	1240
Average.........................	2570.8	1348.4	2540.4	1408.8	2480.8	1271.6	2525.6	1384.8	2321.2	1252.8

1888.—Results of 40 Sets of Experiments also showing action of fertilisers the first year.

Number of sets of experiments with each set of grain.	Salt.		Superphosphate.		Ground Apatite.		Fresh wood ashes.		Farmyard manure.		No manure.	
	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Egyptian oats, 10 experiments.	2557	1427	2481	1487	2410	1428	2300	1298	2706	1576	2480	1294
White Cluster oats, 13 experiments	2064	1168	1979	1204	1711	1013	1912	1076	1946	1119	1806	983
Common 6-rowed barley, 12 experiments	2394	1758	2377	1769	2220	1656	2221	1588	2406	1698	2087	1512
Red Fife wheat, 5 experiments.	1371	916	1565	992	1495	868	1580	952	1755	1108	1580	896
Average of 40 experiments	2221	1393.2	2189	1432.0	2032	1307.6	2073	1274.4	2272	1412.8	2053	1221.6

1889.—Results of 5 Sets of Experiments showing action of fertilisers the second year after they were applied.

Number of sets of experiments with each set of grain.	Salt.		Superphosphate.		Ground Apatite.		Fresh wood ashes.		Farmyard manure.		No manure.	
	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.
	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Black Tartarian oats, 3 experiments.	3180	1440	2910	1360	2780	1397	2700	1340	2725	1477	2560	1226
Common 6-rowed barley, 1 " .	1000	800	900	720	800	640	500	400	800	640	500	400
Democrat Fall wheat, 1 " .	800	720	920	800	880	760	108	920	1200	1000	1000	880
Average of 5 experiments	2040	1168	1910	1120	1810	1058	1745	1068	1863	1214	1655	992

The following table shows the concise results of three years' tests with salt, superphosphate, ground apatite, fresh wood ashes, farmyard manure, and no manure, and includes oats, barley and wheat crops. There are for 1887, 27 tests; 1888, 40 tests; 1889, 5 tests; making in all 72.

Fertilisers.	1887.		1888.		1889.		Average of all crops for three years, being 72 experiments.	
	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.	Straw per acre.	Grain per acre.
	℔.	℔.	℔.	℔.	℔.	℔.	℔.	℔.
Salt, 10 lb. per plot (400 lb. per acre)	2570.8	1348.4	2221.0	1393.2	2040	1168	2340	1361
Superphosphate, 10 lb. per plot (400 lb. per acre)	2540.4	1408.8	2189.0	1432.0	1910	1120	2301	1402
Ground apatite, 10 lb. per plot (400 lb. per acre)	2480.8	1271.6	2032.0	1307.6	1810	1058	2185	1277
Fresh wood ashes, 10 lb. per plot (400 lb. per acre).....	......	....	2073.0	1274.4	1745	1068	2036	1251
Farmyard manure, 700 lb. per plot (14 tons per acre)....	2525.6	1384.8	2272.0	1412.8	1863	1214	2339	1388
No manure	2321.2	1252.8	2053.0	1221.6	1655	992	2126	1217

In all grain and fertiliser experiments the plots were one-fourth of an acre, and the results were reckoned out per acre from the size of plots.

The superphosphate used in these tests was obtained from Smith's Falls and cost $26 per ton, and the ground apatite or phosphate was procured at the same place at $12 per ton.

The analyses of these fertilisers were as follows :

	I. Apatite.	II. Superphosphate.
Water	0.16 per cent.	5.885 per cent.
Soluble phosphoric acid	.... "	10.489 "
Reverted " "	.... "	5.808 "
Insoluble " "	27.848 "	1.313 "
	27.848 per cent.	17.615 per cent.

The analyses of salt showed the following:

Sodium chloride, pure salt	89.42 per cent.
Calcium sulphate—gypsum	1.45 "
Calcium chloride	0.11 "
Magnesium chloride	2.01 "
Insoluble matter	0.18 "
Water	6.75 "
	99.92 per cent.

An analyses of an average sample of fresh wood ashes gave the following :

Water	2.07 per cent.
Insoluble matter	7.68 "
Potash	7.15 "
Phosphoric acid	1.89 "
Lime	37.33 "
Magnesia	3.02 "
Iron and alumina	1.53 "
	60.67 per cent.

EXPERIMENT No. II.

(1) Select a piece of ground of same nature throughout, under same conditions and representative as far as possible of the land of the neighborhood. Avoid naturally wet spots, and keep clear of trees, fences and buildings. Give cultivation to experimental plots similar to that of your larger fields. An advantage would be gained if the plots could be chosen in such a position that they could remain for experiments another year.

(2) Mark off four plots of one-fortieth of an acre each, leaving a clean path two feet wide between the plots. Two rods square is a convenient shape.

(3) Submit all plots to same treatment, and sow one-fourth of grain sent on each. Aim at seeding one inch deep.

(4) Apply the superphosphate sent to plot No. I ; the dried blood and scrap sent to No. II ; farmyard manure to No. III, and leave No. IV without any manure. The fertilisers to be sown at the time of seeding.

(5) Keep plots at all times clear from trespassing by poultry, etc.

(6) Aim at sowing 700 lb. farmyard manure on No. III plot (14 tons per acre).

(7) If it is your wish to carry on this experiment, please inform the Secretary, naming your nearest express office, and there will be sent to you, expressage prepaid, 7½ lb. oats ; 10 lb. superphosphate for plot No. I, and 10 lb. of dried blood and scrap for plot No. II.

Results of Experiment No. 2.

No. of Experiment.	Variety of grain.	No. of plot.	Fertiliser.	Date of Maturing.	Straw per acre.	Grain per acre.	Remarks.	Previous cropping.	Nature of soil.	Name of Experimenter.	County.
					tons	bus.					
I.	Egyptian oats.	1	Superphosphate	Aug. 26	1.09	45.9	Oats from no manure plot had less weight per bushel than each of the other three by two lb.	1886, sod. 1887, peas. 1888, wheat.	Clay loam.	Enos Walker.	Muskoka.
		2	Dried blood and scrap...	26	1.07	45.3					
		3	Farmyard manure	30	1.16	49.4					
		4	No manure............	31	.77	37.1					
II.	Egyptian oats.	1	Superphosphate	Aug. 15	1.53	46.5	The plumpest grain was from No. 3 plot.	1886, 1887 and 1888, oats.	Medium loam.	C. D. Bowman.	Waterloo.
		2	Dried blood and scrap...	" 15	1.50	35.2					
		3	Farmyard manure	" 15	1.94	48.2					
		4	No manure............	" 15	1.40	35.3					
III.	Egyptian oats.	1	Superphosphate	Aug. 24	1.10	23.5	Crop on no manure plot was most affected by rust and was weakest in straw. Grain from No. 2 plot plumpest of all.	Sod.	Sandy loam.	Donald McLaren.	Lanark.
		2	Dried blood and scrap...	" 26	1.20	24.4					
		3	Farmyard manure	" 22	1.14	18.8					
		4	No manure.....	" 24	1.00	17.6					
IV.	Egyptian oats.	1	Superphosphate	Sept. 7	1.42	23.5		1888, Potatoes.	Sandy loam.	William Quinn.	Muskoka.
		2	Dried blood and scrap...	" 7	1.56	27.1					
		3	Farmyard manure	" 7	1.31	27.1					
		4	No manure...........	" 7	1.56	25.9					
V.	Black Tartarian oats.	1	Superphosphate	Aug. 24	1.00	41.2	No. 2 plot withstood the dry weather best. Grain from No. 2 plot plumpest, and straw from No. 2 plot heaviest and brightest of all the plots.	1888, Peas. No manure for twelve years.	Sandy loam.	H. N. Alexander.	Middlesex.
		2	Dried blood and scrap...	" 20	1.24	44.7					
		3	Farmyard manure ...	" 20	1.08	42.3					
		4	No manure............	" 30	.78	34.7					
VI.	Egyptian oats.	1	Superphosphate	Aug. 28	1.58	36.5	Grain from No. 1 plot was two lb. heavier and that of No. 4 plot two lb. lighter than that from the other plots.	1887, sod. 1888, peas.	Clay loam.	George Binnie.	Grey.
		2	Dried blood and scrap...	" 28	1.48	40.0					
		3	Farmyard manure	" 28	2.41	55.6					
		4	No manure...... . ..	" 28	1.15	32.5					
VII.	Egyptian oats.	1	Superphosphate	Aug. 11	2.02	66.8	The crops on No. 2 and 3 plots were lodged more than those on Nos. 1 and 4.	1886, fallow. 1887, spring wheat. 1888, oats.	Clay loam.	Ont. Expt. Farm.	Wellington.
		2	Dried blood and scrap...	" 12	2.33	69.1					
		3	Farmyard manure	" 15	2.46	66.5					
		4	No manure............	" 13	1.91	60.0					

The average results of this Experiment were as follows :—

Fertiliser.	Straw, per acre.	Grain, per acre.	Fertiliser.	Straw, per acre.	Grain, per acre.
	Tons.	Bush.		Tons.	Bush.
Superphosphate.......... 400 lb. per acre.	1.39	40.55	Farmyard manure....... 14 tons per acre.	1.64	43.99
Dried blood and scraps... 400 lb. per acre.	1.48	40.82	No manure.............	1.22	34.73

EXPERIMENT No. III.

(1) Select a piece of ground of same nature throughout, under same conditions, and representative as far as possible of the land of the neighborhood. Avoid naturally wet spots, and keep clear of trees, fences and buildings. Prepare the ground as you would a large field for the same crop.

(2) Mark out four plots of one-tenth of an acre each, allowing a clean path between the plots. Four rods square is a convenient shape for each plot.

(3) Sow the same kind of corn (M. S. S. Corn) on each plot as follows :—

No. I plot—Drills of equal distance apart (as near 3½ feet as possible) with seed averaging two grains to the foot.

No. II plot—Drills of same distance apart as No. I, with seed averaging twelve grains to the foot.

No. III plot—Broadcast or close drills with seed averaging one-half bushel per acre (2.8 lb. per plot).

No. IV plot—Same as No. III with seed averaging three bushels per acre (16.8 lb. per plot).

(4) Aim at having the seeding all done in one day, and not later than 15th day of June. NOTE—Shallow planting for early seeding, and deeper planting if late enough for soil to be warm.

(5) Give plots I and II the same amount of after cultivation, as often as you think they need it, but avoid mounding the rows ; shallow cultivation is preferred.

(6) Purchase 40 lb. of M. S. S. Corn from your seedsman and send the account to the Secretary, C. A. Zavitz, as early as possible, and the money will be sent you until the limited funds of the Committee are exhausted. This will save much unnecessary expense of expressage. If you cannot obtain the corn apply to the Secretary, mentioning your express office, and it will be forwarded to you.

(7) Cut each crop at the time when its condition corresponds to the roasting condition of field corn, or when in the glazed state.

(8) Weigh produce from the plots when under as equal conditions as possible. NOTE—If you can observe the comparative results from the feeding of the different lots please send information under head of "Remarks" in blank form.

(9) Fill out the accompaning blank form and return.

The following is the average for the three experiments in fodder corn :—

	Seed and cultivation.	Percentage of stalks having ears.	Yield per acre. (Estimated from plots 1-10 acre.)
			Tons.
1	Drills (2 grains per foot)	51.7	8.8
2	Drills (12 grains per foot)	1.7	10.0
3	Broadcast or close drills (½ bus. per acre)	13.7	7.41
4	Broadcast or close drills (3 bus. per acre)		9.8

Results of three experiments in growing fodder corn.

	No. of plot.	Seeding and cultivation of crops.	When sown.	Distance apart of rows.	Average depth of planting.	Dates of cultivating and hoeing.	No. of stalks grown per 100 feet.	Depth of cultivating.	Weight of produce.	Percentage of stalks having ears.	Nature of soil.	Previous cropping.	Name of Experimenter.	County.
I	1	Drills—2 grains per foot.....	May 24.	40 inch.	1 inch..	After each rain..............	About 100	2 inch	lb. 766	About 100	Sandy loam.	Sod pasture.	E. M. Zavitz.	Middlesex.
	2	Drills—12 grains per foot.....	" 24.	40 "	1 " ..	" "	400	2 "	1,112	5				
	3	Broadcast or close drill—2.8 lb. per plot (½ bus. per acre).	" 24.	8 "	1 " ..	....	100	None.	1,240	..				
	4	Broadcast or close drill—16.8 lb. per plot (3 bush per acre).	" 24.	8 "	1 " .	....	500	None.	1,000	......				

REMARKS.—Some of the stalks in No. 1 had two ears on. A number in plot 3 had nibbins, but no full ears.

CONCLUSIONS.—On light soil I believe in planting thin as it stands up better and is more easily harvested in drills, about four feet apart. I believe what is minus n quantity will be more than made up in quality.

	No. of plot.	Seeding and cultivation of crops.	When sown.	Distance apart of rows.	Average depth of planting.	Dates of cultivating and hoeing.	No. of stalks grown per 100 feet.	Depth of cultivating.	Weight of produce.	Percentage of stalks having ears.	Nature of soil.	Previous cropping.	Name of Experimenter.	County.
II	1	Drills—2 grains per foot......	June 12	30 inch.	About 3 inch.	Harrowed June 22; cultivated July 6; drills hoed July 9; cultivated July 19.	110	3 inch	2,160	50	Clay loam.	Oats, peas, sod.	Geo. Binnie.	Grey.
	2	Drills—12 grains per foot.....	" 12	30 "	3 "	Similar to No 1...........	650	3 "	2,450	None.				
	3	Broadcast or close drill—2 8 lb. per plot (½ bus. per acre).	" 12	....	....	....	......	......	1,005	30				
	4	Broadcast or close drill—16.8 lb. per plot (3 bus. per acre).	" 12	....	....	....	......	......	2,180	alm'st none.				

REMARKS.—Owing to the cold, wet spring, much of the seed did not grow.

	No. of plot.	Seeding and cultivation of crops.	When sown.	Distance apart of rows.	Average depth of planting.	Dates of cultivating and hoeing.	No. of stalks grown per 100 feet.	Depth of cultivating.	Weight of produce.	Percentage of stalks having ears.	Nature of soil.	Previous cropping.	Name of Experimenter.	County.
III	1	Drills—2 grains per foot......	May 18.	42 inch.	1 inch..	Horse cultivating July 2-23; hand hoeings July 16, Aug. 15..................	97.9	2 inch	2,344	5	Clay loam.	1884 roots, 1885 barley, 1886 clover, 1887 oats, 1888 green fodder.	O.A.C. Experimental Department.	Wellington.
	2	Drills—12 grains per foot.....	" 18.	42 "	1 " ..	Same as No. 1	592.5	2 "	2,413	......				
	3	Broadcast or close drill—2.8 lb. per plot (½ bus. per acre).	" 18.	....	1 " ..	....	......	None.	2,201	11				
	4	Broadcast or close drill—16.8 lb. per plot (3 bus. per acre)	" 18.	....	1 " ..	....	.....	"	2,677	.....				

REEARKS.—At the time of cutting many of the leaves of No. IV plot had turned yellow, while on Nos. I and III the leaves were green and thrifty looking.

CONCLUSION.—Owing to only about one-half of the seed germinating, this experiment is considerably modified thereby.

EXPERIMENT NO. IV.

From the Southern States, where Kaffir corn is extensively grown, we obtain the following information: It stands dry weather well. Where corn will suffer from drouth, this plant will simply stop and wait for rain, and then go on and make its full yield. In the way of dry fodder it makes enormous returns. It will grow on any land suitable for corn, and even on land too poor for that crop. Its seed weighs 50 lbs. to the bushel.

This one—Kaffir corn—is the earliest of the five varieties of non-saccharine sorghums. It grows from four to five feet high, making a straight, upright growth, having a stocky stem with numerous wide leaves. The stalks keep green and are brittle and juicy, not hardening like other samples of sorghum, making excellent fodder, either green or dried, which is highly relished by cattle and horses. The seed heads form at the top of each stalk, and as soon as these show the grain well the joints next below the top send up shoots which yield the second seed heads. If the crop is wanted mainly for fodder it is recommended to cut down the whole stock when the first seed heads come into bloom, at which stage it cures admirably and makes most excellent forage.

The pound of seed sent to you is sufficient to plant one-quarter of an acre of ground. The first week in June is recommended as the best time for planting. The land need not be very rich, but should receive similar cultivation to that for an ordinary corn crop. The rows should be three feet apart, with from 3 to 4 seeds per foot. The cultivatings or hoeings between the rows should be the same as for common corn. The proper time to cut the fodder is when the first seed heads come into bloom.

The Kaffir corn was recently received from S. Carolina for the Dairy Department. A portion has been handed over to the Experimental Union for distribution. We think this valuable fodder plant may do well in your section, and that it would be to your interest to give it a trial.

The Kaffir corn has not proved a very marked success in our climate, the average results of six experiments being as follows: Weight per plot 1,665.5 lb., or 16,655 lb. per acre, being 8.3 tons of the green fodder.

CORN AND HOGS AS SOURCE OF PROFIT IN FARMING.

BY BYRON ROBINSON OF WHEATLEY, ONT.

The territory in Ontario, with the climate suited for the growing of corn, is very limited, but the crop can be grown in almost every part of the province for fodder for soiling purposes during summer and autumn, or for storing in the silo, or lastly for drying for winter use. But in Essex corn is one of our best grain crops. We prepare our ground about the second week in May. After having the ground plowed in the fall, we cultivate and harrow well in the spring and then mark out in rows four feet apart both ways, plant with a hand-planter, and in about two weeks the corn will be up and ready for the horse-hoe and will need about the same culture as any other hoe crop. When ripe, which will be inside of one hundred days after planting, cut, put in shocks with from eight to ten hills square in a shock. A good average crop of corn will yield one hundred bushels of ears per acre, and the fodder will be as good as a light crop of hay, and will pay rent and taxes on the land. The cost of growing an acre of corn after using the fodder as above mentioned. will be as follows:

Plowing ground	$ 2 00
Cultivating and harrowing	60
Marking	20
Planting	20
Horse-hoeing, three times both ways	4 50
Cutting	1 00
Husking	4 00
Cribbing	50
Total	$13 00

At this rate the corn would cost exactly 13 cents per bushel of ears. We find by experiment that it takes twenty bushels of corn in the ear to make one hundred lb. weight of pork, which, after allowing the manure for attending the pigs, will cost $2.60 per hundred, and we are safe in counting $5 per hundred dressed pork. This leaves a profit of $2.40 per hundred, or $12.00 profit on growing one acre of corn and feeding the produce to hogs.

Farmers in the corn belt, owning from twenty-five to fifty acres of land can make greater profits in raising hogs than can be made with any other stock, as they require less grass land.

The grain would be fed to the hogs, and the fodder when saved will suffice to winter the necessary cows.

If what is taken from the land be returned in the shape of manure, corn can be grown on the same ground for any number of years without any fear of impoverishing the soil. Corn has been grown for twenty years in succession on the same land with us without manure, the last crop being as good as the first. But farmers in possession of larger tracts with considerable quantities of natural grass-lands, can do better by feeding corn to cattle on pasture. Our conclusions have not been arrived at by theory, but by practice.

The breeding and management of swine constitutes one of the most important branches of agriculture in the south-western parts of Ontario, and none but the best breeds should be allowed on the farms. A single pair of any of the improved breeds would increase in three years sufficient to stock the largest farm. The boar could also be used to forty or sixty other sows. After making up your mind to any one particular breed, grade or cross, stick to it and you will be sure to succeed better than by mixing, and in any case do not breed the same sow to two boars of different breeds. After the breed is secured, then there should be the best of feeding and care daily from the time they are born until they are slaughtered, or sold at live weight as the case may be. As a rule a sow should not be allowed to farrow under the age of fifteen months, and the boar is not fit for continued service until he is eighteen months old. A sow will breed three litters a year, but in our opinion two is plenty ; one in spring and the other in the fall. And in fact, some of our best breeders are advising but one litter a year, and that to be dropped in the spring, as they may be fed in the summer with mostly green fodder and pasture, only giving grain at night, When a sow is to farrow in cold weather, provide a good warm pen, but allow her and the little pigs to have free access to fresh earth daily. We have lost pigs by keeping them confined too close, but never lost one when the above method was carried out. When the weather is warm let the sow shift for herself. After a sow has farrowed give her warm drink for three days, and feed sparingly on soft food and under no circumstances feed as to make the young pigs unduly fat. When they are from three to four weeks old, geld, and in about sixteen days they will be old enough to wean. The period for feeding pigs, being from weaning to selling time, should have the greatest of care. The market no longer requires the hog of four hundred lb., and experiments show that it takes five per cent. more food to make one pound of growth on one hundred and fifty lb. pig than it does on a fifty lb. one. It is therefore evident that the greater profit will be realised by pushing the young pigs along as fast as possible. Our method for feeding in summer is to let the hogs run in yards that have been sown with clover or with grass. We feed all the grain food we can, such as clover, oats, peas, pig-weeds and sweet corn. When the pigs are first weaned skimmed or butter-milk is excellent food, but when that cannot be obtained a little linseed or oatmeal and shorts mixed with kitchen swill will answer, later on give as much mixed grain, shorts, bran, etc., as they will eat, and we always finish with corn, as pork finished on corn always brings the highest price. In winter, follow as near as possible the above rule as regards feeding, try and replace green fodder with something else such as roots. In all cases give plenty of fresh water no matter how sloppy the food may be. Give a little sulphur occasionally, and plenty charcoal ashes, salt and fresh earth. Keep pens and specially bed, clean and dry. We would advise selling by live weight, as the day is not far distant when no hog will be slaughtered on the farm, and sold by dress weight, and the sooner that day comes the better for both the hog raiser and the packer.

Mr. BRODIE—Would you advise selling pork by live weight or dressed?

Mr. ROBINSON—I would advise to feed during summer and sell live weight in the fall.

Mr. SHORE.—Do you harrow corn in your section?

Mr. ROBINSON—Yes, I have practiced this a good deal, and can recommend the system very highly, but the corn should not be harrowed when more than 1½ inches high. I would advise having hills four feet each way. This is for raising the grain that I am speaking.

Mr. SHORE—How can you get enough manure with hogs?

Mr. ROBINSON—We do not need much manure in Kent.

Mr. ——— How many grains do you put in each hill?

Mr. ROBINSON—We like four stalks, but put six grains in the hills. Iadvise planting in a double hill.

Mr. SINCLAIR—Instead of leaving the female until twelve months and the male until fifteenth months, I would prefer using the sows at eight months and the boars at twelve months of age.

Mr. ROBINSON—I believe the sows should mature before breeding. I am of the opinion that a cross from a Berkshire boar and Yorkshire sow would make a fine animal.

Mr. HOBSON—Why is the Yorkshire white preferred by the shippers?

Mr. CLARK—The demands of the hog market have varied very much during the past few years. Formerly, a very fat hog was required, but what is called for now is a pig weighing from 150 to 180 or 200 lb., with the pork well streaked. I think the main reason for recommending the Yorkshire is because at that age they produce the desired kind of pork, and spring litters will produce the required material in the fall.

Mr. SINCLAIR—I also think it is the superior side meat of the Yorkshire that is desired—the meat being streaked and the side long. I would advise crossing a Yorkshire sire and a Berkshire sow and the desired hog will be produced, and you will get an early-matured pig.

Mr. CLARK—Another advantage of Yorkshires is the fact that they are white.

Mr. SHORE—Farmers in England grow hogs very rapidly and sell before getting very fat, and I think we should not grow ours too fat.

Mr. HARCOURT—I notice in the Wisconsin report that there is a great deal of stress put on the way of feeding to produce pork of the right quality.

Captain HOOD—I very strongly advocate crossing a Berkshire boar with a Yorkshire sow.

THE FARMER'S SON BEFORE AND AFTER A COURSE AT COLLEGE.

By J. B. MUIR, NORTH BRUCE.

The title of my essay is one in which the most of us have a personal interest, as the great majority of those present are farmers's sons with or without the advantage of a two year's course at the O. A. C.

But that use of the term, farmer's son, is too comprehensive for our purpose, and we must limit it to the particular sons who are making agriculture their professsion. If we acquaint ourselves with the early history and training of the average farmer's son of to-day, we shall generally find a moral, careful, and hard-working young man. One who in common with his parents is striving to the best of his ability to raise remunerative crops and earn an honest living.

To do this he has for his principal guides past experience and observation, interspersed with hints from agricultural papers and journals. These, when properly mixed with good common sense, are no mean guides, and in the past have carried many of our farmers in safety to comparative ease and plenty. But in this age of competition, exhausted soils and uncertain seasons, the guides mentioned are often insufficient and we find many farmers young as well as old, straying gradually and surely into bankruptcy. Sometimes this is the result of bad management; at others it is produced by unforseen circumstances; but more frequently it is due to ignorance pure and simple, as to the nature and treatment of the soil, stock, and crops with which we have to deal.

Hence we find that the intelligent thinking class amongst the farmers are availing themselves of every opportunity for increasing their knowledge, both theoretically and practically, in agricultural lines. In like manner, also, the sons of quite a number of the better class of farmers are taking the two year course at the Ontario Agricultural College to prepare themselves for meeting the difficulties incident to farm life. In all this, experience is teaching us that in order to be successful we must have more knowledge, more of other men's ideas stored up within us ready for us when required. To be an intelligent man, or a graduate of the Ontario Agricultural College, does not necessarily make us successful. It is only when the knowledge we possess is rightly applied and persevered in that success will crown our efforts.

We have already stated that knowledge is not success; it is rather that by which the road to success is made easy. The farmer's son, before taking the Ontario Agricultural College course of study, finds the road uneven and hard to follow; but after taking the full course, he finds it graded and carefully marked out. He has now for his guides the experience and practice of the ablest men in his profession, while the leading truths and principles in agricultural science are at his disposal. He has, as it were, a part of nature's laws revealed to him; while his duty to nature has been more clearly defined. Instead of following on blindly in the practice of his ancestors, he is able to press forward intelligently into the front ranks and make agriculture a success.

Instead of being a slave and a drudge in his profession he rises above this, and takes his chief pleasure and delight in subduing nature and her difficulties, under his control. Instead of grinding out every trace of natural fertility in the soil, his aim is to keep it constantly renewed and increasing from year to year. Instead of simply keeping and half starving the poorest class of stock he strives to keep the most and best of any in the neighborhood. Instead of sending off the best of the manure to grow sea-weed in the Atlantic Ocean, it is carefully saved at home and set at growing corn and other cereals.

These are a few of the distinguishing features between the farmer's son before and after a two year course at the O.A.C. But these are not all, we find a great improvement in the social position of the farmer's son after graduating successfully. His is now a position of honour in the farmers' councils, institutes, agricultural societies and the like, and even in church and state affairs his influence is greatly advanced. His mode of farming is carefully watched and if successful copied more or less by his neighbors. His advice is also frequently asked for, and in this way he finds his sphere of usefulness greatly increased.

But there is yet another aspect of this question, of even greater importance than any we have yet mentioned. The course of training prescribed and followed at the O.A.C. is one especially fitted for developing the mind. It embraces many subjects, and ranges through so many fields in nature, that an appetite for knowledge must be stimulated in the minds of the most indifferent. To satisfy this there is a great variety of choice literature over which the cultivated mind delights to roam. This desire to read and improve the mind is one of the few pleasures of which we never grow weary, and one in which the Ontario Agricultural College graduate has the advantage. The life of the average farmer's son is one of physical labor in which there is little time to cultivate a taste for reading or other intellectual improvement. His education, though it may be the best the public school can supply, is not not broad enough, nor advanced enough, to stimulate a desire for knowledge, especially agricultural knowledge, of which he stands most in need. Much of his early training is lost from not being able to connect the ideas conveyed in the lessons with future usefulness. The foundation of his early training is not broad enough to enable him to understand even the simplest works on agricultural science, which all require more or less knowledge in chemistry. This branch of science, so mysterious and yet so simple, is the key to agricultural knowledge, and the average farmer's son is almost ignorant of its existence.

The science course at the Ontario Agricultural College opens up an entirely new field to the student of nature, and an intelligent farmer must study her closely, both for pleasure and profit, to be suceessful. Consequently, the Ontario Agricultural College graduates have a great advantage in this respect over those whose education is limited to a public school. But it may be maintained by some that a careful course of reading would supply all the pleasures obtainable from having an educated mind. But this is not the case, we must come in contact with well trained men that the truths read may be impressed and retained, and no amount of reading will compensate for a deficiency of practical proof and experience. Truths read and lessons taught are fully appreciated only when taught and explained by practical men.

But the question which interests us as graduates and ex-students is not, what are the advantages of the Ontario Agricultural College course of study, but are we rightly employing and improving the advantages we feel we have gained by our two years of practical study? Are we doing what we should to build up and maintain the reputation of our college, that others may be induced to go there and be benefited? Are we, as individuals, striving to do the best for ourselves and our country according to the instruction given us? Our position is evidently in the front ranks, leading the agricultural thought and practice of our fair Province; let us, therefore, be alive to the position we hold, and show, by practical proof, that we and our college are able and fitted to lead ourselves, and farmers generally, to success, in this age of agricultural depression. Much good work has been already done, but there is yet a great deal of progressive, intellectual labor required before the science of agriculture is understood by the vast majority of those who cultivate the soil. At present they are uncertain whether the training given at the Ontario Agricultural College is practical or not; let it be the aim of each one of us to show by practical proof and experiment that it is practical, and that we are better, wiser, and more successful farmers after taking the two year course of study at the Ontario Agricultural College.

THE NEED AND USES OF EXPERIMENTAL WORK IN DAIRYING.

By Prof. James W. Robertson, Dairy Commissioner, Ottawa.

Following is a synopsis of an address by Prof. Robertson:

Improved methods of agriculture have grown out of experimental work, pursued with more or less intelligence aud care since the times of Adam and his remarkable son, whose jealousy and envy at Abel's success seems to have become the possession or possessors of some of his craft, by whom every effort to do things in any other way than according to their preconceived notions, is taken as a personal rebuke and cause for dislike to this day. An increosed knowledge of the laws that govern the changes in nature, which farming seeks to bring about and control, has come from crude and intermittent experiments, as well as from the well-planned, skilfully-conducted and continuously-pursued investigations, which have been made at the experiment stations so liberally devised and supported by governments on this continent during recent years. In time to come, experimental work in dairying should not be confined to the government experiment stations.

The Ontario Experimental Union may, with advantage, take up some branches of it, with the certainty of giving valuable service, enlightenment and encouragement to the farmers of the province. The need of further investigation, through experment, has increased rather than diminished.

The purpose of all intelligent effort in farming, is the creation of wealth and the making of profits for the persons who are engaged in that occupation.

In exchange for the products of the fields and animals the farmer obtains what may be called here gross receipts. The gross receipts may include cash, goods received in trade or exchange, house-rent, board, lodging, the use of horses for pleasure and work, etc. A large proportion of the gross receipts of most men, except farmers, must go out as expenditure for those things which the farmer gets from his products over and above the cash which he handles. A small cash income does not always mean a small income, nor does a large sum as gross receipts always indicate a large profit. The measure of profit is the difference between receipts and expenditure. All experimental work that helps to show how expenditure or cost may be reduced, without lessening the quantity or degrading the quality of the products in dairying, is legitimate work worthy of your union.

Investigation may be directed profitably by one or more members, towards the discovery of how far and in what ways expenditure or cost of production can be lessened under the following heads :—

I. *The use of feed of cheaper sorts.*—Can corn be produced at a cost of $1.75 per ton on the ordinary farm? How much of it will produce as much milk as one ton of hay? How does the cost of soiling compare with that of pasturing for milk production in different districts of the Province? Are roots as economical for a succulent food as corn or other ensilage?

II. *The mixing of feeds into the best combinations.*—Is the nutritive ratio theory sound, when acceptability of flavor is ignored?

III. *Providing and preserving fodders and grain in the most acceptable condition of flavor.*—What is the worth of a ton of hay that has been exposed in the feeding passage for a day and mussed over, compared with a ton of hay of equal quality fresh from a compact mow? Does digestibility of feed depend in any degree upon its palatability?

IV. *A reduction in the quantity of feed offered to cattle.*—When a cow eats too much rich feed, an immediate consequence is a lessened flow of milk of impoverished quality. Are many cows spoiled by over-feeding?

V. *A lessening of the cost of labor and expense in producing, manufacturing and marketing.*—Is there any advantage in carrying on dairying in winter in respect to the labor available on the farm during that season? Can butter and cheese be made as economically in small lots in private dairies as in co-operative factories? Can dairy goods for the home market be sold best direct into the consumer's homes from the producers? Will it pay the producer to sell always, when perishable goods are in the best condition, regardless of the current or prospective price?

I have used a great many interrogation points. In trying to answer the enquiries every honest investigator will learn much and to some extent become a teacher to instruct and stimulate others.

The tendency to devote one's whole attention to the receipts as the source whence may be obtained an increased profit is a common weakness of judgment, when a business calculation is being made, The reduction of expenditure or cost of production is a more controllable factor in profit-making, and still there are safe and economical ways in which receipts can be legitimately and certainly augmented. Practical enquiry may seek to learn from experimental investigation, to what extent that may be accomplished under the following heads :

I *Enlargement of the capacity of the animal.*—May not the capacity of every dairy cow be enlarged, until she gives annually as many pounds of solids in her milk as her live weight?

II. *Improvement in the quality of the product.*—How far can the quality of milk as to its per cent. of solids be varied by feed and treatment of the animal? How far does the quality and the kind of feed influence and affect the flavor of animal products. The quality of all food products not only modifies the market price, but gives stability or uncertainty to the demand in degree as it is uniformly fine or irregular and inferior.

III. *Selling most of the product at a season of the year when prices rule highest.*—Is cheese making in summer and butter-making in winter the best dairy practice for the farmer, under ordinary conditions in Ontario?

IV. *Marketing products in the best concentrated form.*—Will the labor and expens of special preparation, in giving products an attractive appearance for the market, add more to their value than the extra cost involved? Will such a preparation help to secure a class of customers able and willing to pay the highest current prices?

V. *Making the most of by-products.*—Animal products from the dairy retain an average of less than 20 per cent. of the total nitrogen, phosphoric acid and potash in the feed consumed. The manure which contains the residue of these from the feed is the first by-product. Although it contains over 80 per cent. of the valuable constituents of the feed, it is not worth 80 per cent. of the original value. How can it be saved and used to yield the greatest value? Skim-milk, butter-milk and whey are by-products. In what combination can they be fed with most profit to calves, colts and swine?

The common dairy practice is a reproach to the business judgment of the farmer. Many cows are fed at an annual loss. They board on men who can ill afford to support indigent cows on the out-of-door relief plan. Single cows in some herds, like the Egyptian lean kine, in everything but appearance, swallow up the profits of two cows which are exercising the profit-making talent. Thoughtful experiment in any kind of a way, along the line indicated, cannot fail to convince any farmer of the possibility of realising some profit from dairying, and may stir him up to try for more while helping him to succeed in getting it. An experimenter generally becomes enthusiastic, enthusiasm is contagious and practical investigations keep it operative in beneficial ways.

Mr. HOBSON—Do you still advocate feeding twice daily?

Prof. ROBERTSON spoke much in favor of feeding twice daily.

Mr. ROBINSON—We used to feed four times a day, but on hearing Prof. Robertson advocate feeding twice daily, we have adopted the plan and like it well.

Prof. SHAW—How soon should corn be put into the silo after it is cut?

Prof. ROBERTSON—Every crop for the silo should be near maturity and allowed to wilt until it reaches about 73 per cent. water. I would cut it from one to two days before filling into silo. Sunlight upon plants after they are cut, seems to produce an aroma in the fodders which is much liked by stock, and gives a greater feeding value to the crop.

Mr. ZAVITZ—To what height would you recommend a silo to be built?

Prof. ROBERTSON—I would not recommend a silo over 20 feet except in special circumstances, and never more than 25 feet.

Mr. HOBSON—Would you recommend a plank floor to a silo?

Prof. ROBERTSON—I would prefer a clay floor.

Mr. ZAVITZ—How did the experiment with the different walls of the silo turn out this winter?

Prof. ROBERTSON—We have a silo built with all its sides differently constructed, which are about as follows: The studding was 2′x10″ on each side, and one wall was made by simply nailing one thickness of undressed lumber horizontally on the inside of the studding. Another was made by having the lumber tongued and grooved, and dressed on one side, and with tar paper between the lumber and the studs. The third had first inch lumber dressed on one side, then tar paper and inch lumber dressed on one side, and the other side was similar to No. 3 wall, but the lumber was tongued and grooved. The only silage that was at all spoiled was that in for about 3 or 4 inches along the side first described. I would recommend a covering of poles and straw over the silage. I will always go against painting the inside of a silo with tar, but petroleum is a good thing to preserve the wood.

BARLEY GROWING IN ONTARIO.

By Mr. T. G. Raynor, B.S.A., Rosehall.

Barley was grown as a cereal crop in very remote times. We learn from Ex. 9,31 that when Moses was pleading with Pharoah to let the Isrealites go, one of the plagues was a violent hailstorm which destroyed the barley crop then in the earing stages. In the time of our Saviour barley was used as a breadstuff, as is indicated in the narration of the miracle "The feeding of the five thousand." Of its value we find that in Rev. vi. 6, it was considered to be worth only one-third of what wheat was valued at.

Of its abuse we learn nothing until a much later date. Gambrinus, a legendary king, is regarded by the Germans as the inventor of beer. His memory is kept fresh by pictures of this supposed person, which are hung over the bars of many of the beer drinking dens, especially in Germany which is second to Great Britian in the manufacture and consumption of beer. It is estimated that the total yearly output of all the nations has now reached the enormous amount of 4,970,500,000 gallons.

Many years ago the farmers of Ontario found it profitable to grow barley for the export trade, the great bulk of it going to the United States. The acreage devoted to this crop increased from time to time as wheat growing in many parts became unprofitable, as a result largely from injudicious cropping of wheat after wheat, wheat after wheat, and wheat for a change. Very little was returned to the soil in the shape of manure, to supplement the plant food which was being manufactured in the soil and what came from the atmosphere. So that I find, taking the bureau of industries as my authority, that for the last seven years the average number of acres sown to barley is 757,525, yielding nearly 20,000,000 bushels, or an average of 26.1 bushels per acre. Compare with the other cereal crops grown, barley stands third in the amount of acres sown, and second in the yield per acre; more land being devoted to wheat and oats, but only the latter leading in the quanity per acre.

The yearly average export of barley for the eleven years 1868-87 has been 8,210,222 bushels, valued at $5,674,014, or 69 cents per bushel. From these figures we gain some idea of the importance of the barley industry to this Province in the past; and the present outlook would indicate that its importance as an export crop was altogether a thing of the past. However, the bright side of the picture may again turn to us before we anticipate it.

From observation we learn many things, and among them, that Ontario is specially adapted for the successful development of many important industries. Her water power climate, soil, and other natural resources are all conducive to this end. Examining more closely we find that Ontario has many local conditions favoring each separate industry. To illustrate, only four or five sections are really adapted for fruit culture, other sections for stock raising and dairying, and even the cereal crops are partial to local conditions, such as soil and climatic influences. Let us apply this to barley growing. Once more referring to the bureau of industries I find the counties bordering on the Bay of Quinte, lakes Ontario and Huron, Georgian Bay, with the inland counties of Victoria and Peterborough, to be the chief barley growing sections of the Province. Examining the soils of these counties we find a great deal of heavy and gravelly clay soils, with in some instances clay loams all of which produce the best samples of barley, at the same time bear in mind the fact, that all these districts are more or less influenced by the large bodies of fresh water lying adjacent to them.

Barley is grown chiefly for two purposes, viz., *malting and feeding*. As the great bulk is grown for the "brew of the world," one object should be to grow it suitable for that purpose. What the malster desires in brief, as I understand it, is a plump, bright, heavy barley, containing a large percentage of the carbohydrates, which will malt in the quickest possible time, and uniformly. Besides manufacturing beer from the malt, much of the bright barley, by distillation, goes to make the "pale ale" and "porter," which are delicate whistle wetters for the nabobs.

Land devoted to barley growing should be prepared in the *fall*, for spring seeding. Any preparation made for a wheat crop is quite as suitable for barley, as sowing a bare fallow, after a hoed crop, on clover sod plowed in the fall, or after a pea crop, where the land has been ganged, repeatedly stirred with the harrow and cultivator, and finally plowed with a single plow, throwing the furrow well up to the action of the frost, or simply ridging it. In spring, prepare the seed bed before sowing, getting it in as fine a state of tilth as possible, being careful not to work the seed bed to a greater depth than four inches (as barley is a shallow growing crop and requires its plant food at the surface.) If the land be in good condition and dry, drill; if very moist, broadcast; in either case be careful not to cover too deeply, one inch to one and one-half inches is plenty. Sow at a time, if possible, when the seed will germinate uniformly and continue to grow vigorously. From one to two bushels is the quantity sown per acre, varying with the kind of soil. I prefer one bushel, if drilled, or one bushel and a peck where broadcasted. I am of the opinion that in many parts of the country too much seed is used per acre, except, perhaps, where farmers have to provide for injurious insects. Manures for barley should be applied as a top-dressing, or merely worked into the surface soil. Top-dressing in winter with farmyard manure where barley is to be sown gives splendid results. If special fertilizers are used apply them at time of seeding. Nitrogenous and phosphatic manures are the best, especially the latter, as barley draws more heavily on nitrogen and phosphoric acid than on the potash and other ash constituents of the soil. Carrying out these conditions, with a favorable season, we may expect good results, but our work doesn't stop here. Harvesting is a critical point usually, more especially regarding the color, as barley is very susceptible to heavy dews or showers. Some one has said that there are only three days in which to cut barley: the day before it is ripe; the day it is ripe, and the day after it is ripe. I would advise to begin cutting the day before it is ripe, to get as much cut as possible on the day it is ripe, and finish the day after it is ripe. Ripe seeds malt quickest. There is often three and four days difference in the malting properties of barley, due for the most part to the different stages of maturity. Cutting with the self-binder has many advocates and many points in its favor. Unless it is entirely ripe, I think a better way is to swath it with a reaper, allow it time to cure, rake with a horse-rake into winrows, and if the weather be favorable house it, if not, cock it up. It is decidedly better to let barley sweat out in the mow than to thresh early and leave in large heaps. Barley, on the whole, I think is the easiest crop to handle on the farm, and can be grown with the least outlay. In fact it might be considered "the lazy man's crop."

The marketing of barley often gives the farmer more anxiety than all the trouble in growing it. Taking one year with another I believe the *early market* is the best, and by selling early it saves much uncalled for worry. But, says some one, we cannot afford to grow barley any more for 33c. to 43c. per bushel, and I must agree with the sentiment. Are there no means of making barley growing profitable, notwithstanding the keen competition of the Western States and our own great North-west? This competition doubtless has been *the* prominent factor, along with the over-production of the past year, in reducing the price. I will try to suggest a few ways out of our present difficulty.

AS REGARDS FUTURE PROSPECTS OF BARLEY GROWING IN ONTARIO.

1. We must lower the cost of production and produce more per acre. This would mean less hired labor, the tilling less land and the enriching and cultivating better what land we do work.

2. Remove the restrictions at present existing on the export trade in barley. Where the price of an article is fixed in a foreign market, under a protective policy, the producer has to pay the duty when exporting his produce there, so that, the Ontario farmer marketing 500 bushels of barley with a duty of 10 cents per bushel on it, gets $50 less for his crop than he might have received had there been no tariff wall. I learn that during the years 1885-6, we exported from Ontario to the United States 20,178,877

bushels of barley, valued at $13,696,224. On this we paid as duty $2,017,887, or $1,008,943 for one year. The argument is self-evident. Down with the tariff!

3. Why could we not become the source of supply for American seedsmen? Our conditions are favorable for growing first-class seed, and northern seeds are preferable for southern climates.

4. What is there to hinder us growing two-rowed barley for the English market? Could not the governments of the day be influenced to import a considerable quantity for experimental purposes and see if our conditions are not favorable for growing barley of the right stamp for the English market?

Barley has always ranked pretty high as a grain for feeding purposes. If we have to turn our attention more to stock raising and dairying than we have in the past, there is no reason why barley should not play an important part in the rations prepared for such purposes. It is a good grain for horses, especially when used with cut straw or hay, and it is an excellent feed for growing and fattening hogs. Having a nutritive ratio of 1: 8.2 it is better to feed it in conjunction with other fodders of a more albuminous character. It should be cracked, not floured, for feeding purposes; and here is where many farmers make a great mistake in having the coarse grains ground too finely. It is better to allow nature to do most of the work. Even the straw has considerable feeding merits, especially where bulk is required, and even the *beards*, when boiled and fed with the *tea*, make a nourishing article of diet for calves.

I will not discuss here the moral aspect of barley growing, as "a great deal might be said on both sides;" but will respectfully submit these few thoughts for your consideration, hoping I have suggested enough to form the basis of a lively discussion.

CLOSING EXERCISES.

After moving a vote of thanks to the retiring officers of the association, to the representatives of the "Press" present at the different sessions, and to the visitors, many of whom had taken an active part in the various discussions, the Eleventh Annual Meeting of the Ontario Agricultural and Experimental Union was brought to a close at 5 p.m.

III

THE AGRICULTURE AND ARTS ASSOCIATION.

To the Hon. JOHN DRYDEN,
Commissioner of Agriculture, etc.

I have the honour, on behalf of the Council of the Agriculture and Arts Association of Ontario, to present the Report of their proceedings for 1890, the Report of the Prize Farm Judges, the Essays to which prizes have been awarded, the Report of the Secretary's visit to England and Scotland, Report of three Provincial Plowing Matches, the Report of Fat Stock Show at Guelph, the Report of Prize Awards at Toronto, London and Ottawa, and the Principal's Report of the Veterinary College, along with a list of the graduates for 1890.

I have the honour to be,
Your obedient servant,

HENRY WADE,
Secretary Agriculture and Arts Association.

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FORTY-FIFTH ANNUAL REPORT

OF THE

AGRICULTURE AND ARTS ASSOCIATION

OF ONTARIO.

MINUTES OF ANNUAL MEETING.

The annual meeting of the Agriculture and Arts Association was held on March 13th and 14th, 1890, in Agricultural Hall corner of Yonge and Queen streets. The chair was occupied by Mr. Albin Rawlings, Forest, and there were present the following gentlemen :—Messrs. Ira Morgan, Metcalf; Joshua Legge, Gananoque; P. R. Palmer, Belleville; Robert Vance, Ida; J. C. Snell, Edmonton; Nicholas Awrey, M.P.P., Binbrook; Wm. Dawson, Vittoria; James Rowand, M.P., Dunblane; Hon. Charles Drury, Crown Hill; C. M. Simmons, Ivan.

The minutes of the previous meeting were read and confirmed.

A telegram was laid on the table from Mr. J. C. Rykert regretting his inability to be present.

The following communication was laid on the table from Mr. A. Blue :—

Members elected to serve on the Council of the Agriculture and Arts Association, as on the 15th January, 1890:

Division No. 9—William Dawson, ... Vittoria Post Office.
" *10*.—James Rowand, ... Dunblane "
" *11*.—Charles Munn Simmons, ... Ivan "
" *12*.—Albin Rawlings, ... Forest "
" *13*.—Hon. Charles Drury, ... Toronto "

Certified,

A. Blue,
Deputy Minister Agriculture.

Toronto, 4th March, 1890.

The secretary, Mr. Henry Wade, presented his report for the year as follows:

AGRICULTURE AND ARTS ASSOCIATION OF ONTARIO.

SECRETARY'S REPORT, 1889.

To the Council of the Agriculture and Arts Association of Ontario:

GENTLEMEN,—I beg leave to present my Annual Report of the work done by this Association, for the year 1889.

REGISTRATION OF LIVE STOCK.

		Males.	Females.	
Horses—				
Clydesdale	4th vol	258	289	
Shire or Cart	1st vol	23	10	
Draught Horse	2nd vol	40	40	
Office Record	1st vol	41	26	
		362	365	Total.. 727
Cattle—				
Ayrshire		100	59	
Hereford		15	7	
Polled Angus		10	5	
Devon		8	4	
		133	75	Total.. 208
Swine—				
Berkshire		346	404	
Suffolk		25	22	
Yorkshire		51	78	
		422	504	Total.. 926

Our cash receipts for 1889, were for registrations	$1,838 76	
For Herd Books sold	390 50	
		$2,229 26
" for 1888		2,117 50
" for 1887		1,413 15
" for 1886		1,613 25
" for 1885		2,175 75
" for 1884		2,587 00
" for 1883		2,608 00
" for 1882		2,368 60
" for 1881		2,550 44
" for 1880		1,230 32

I insert this table in order to show the fluctuations; the year 1880 was the last year of Mr. Craig's secretaryship, 1881 my first; 1885 was the last year that we took registrations for the Canada Short Horn Herd Book, the total fees for that year were $2,175.75. You will observe, that during the past year, I have collected $2,229.26, without receiving fees for the Short Horns, which shows that the work of registration of animals is looking up.

HORSES.

Clydesdale Horse Association of Canada.

The membership of this Association fluctuates, but is about the same as last year, as to the number of members, 207 paid their fees last year, the cash receipts were $1,108.36, out of which was paid $397,00 in premiums at the Spring Stallion Show, and $40.00 each to the Provincial and Industrial Exhibitions, for special prizes.

Vol. 3 of the Stud Book was distributed to the members early in the year, and vol. 4 is now nearly ready for the members of 1889. The 4th annual show has just taken place and has been very successful.

Shire or Cart-horse Association.

This Association has been established and has a membership of 22, it is still in its infancy, but is likely to come to the front; there are nearly enough pedigrees on record to complete the first volume.

Draught Horse Association of Canada.

The first volume has been published during the past year, there are 52 members. The standard is as high as in the Clydesdale and Shire Associations.

OFFICE RECORD.

This is to record the breeding of animals with fewer crosses than can be admitted into the regular Stud Books and has done very well.

CATTLE.

Dominion Short Horn Breeders' Association.

Although not under the control of the Agriculture and Arts Association, is still in a sense affiliated with it, they received for registrations last year $2,668.50 and from members $1,772.00, a good showing.

Dominion Ayrshire Breeders' Association.

This Association has held its annual meeting and has decided not to close the 1st vol. of the new series until December of the present year. The roll of members numbers 40. Some new importations have been made, and in spite of the hard times the Ayrshire interest is in a prosperous condition.

The Hereford, Polled-Angus and Devon Cattle are not numerous, therefore no Association of these Breeders has been formed.

SWINE.

Berkshires.

More of these pigs have been recorded during the past year than ever. It will be seen by the record that a very large volume could be published.

Improved Yorkshires.

This fine breed of pigs is coming to the front very fast, no fewer than 129 having been registered during the year.

Suffolks.

They do not seem to have moved much during the last year, about the same numbers recorded as in the year before.

A swine breeder's Association has been formed, consisting of breeders of all kinds of swine; no doubt this Association will assist in developing the various breeds.

SHEEP.

A sheep breeder's Association has been formed which has held two meetings, and will hold another on the 14th of the present month.

EDUCATIONAL SCHEME.

This was badly patronised and the council have decided to discontinue it.

PRIZE FARMS.

This year group No. 3, consisting of the Counties of Grey, Bruce, Dufferin, Huron, Perth and Wellington, were looked over by the Judges, and as prizes were given for the best farm in each township, it was considered necessary to dispatch two sets of Judges, their able reports on the various farms will be found in the Report to the Commissioner of Agriculture.

FOR THE YEAR 1890.

1. Prizes will be awarded by the Agriculture and Arts Association of Ontario, for the best managed farms in Group No, 4, comprising the following Electoral Districts with their various Township Societies.

1. PEEL.—
    1. Toronto.
    2. Toronto Gore.
2. CARDWELL.—
    3. Adjala.
    4. Albion.
    5. Caledon
    6. Tecumseth
8. SIMCOE, W.—
    22. Flos.
    23. Nottawasaga.
    24. Sunnidale.
    25. Vespra.
9. ALGOMA COUNTY ONLY.—
10. MUSKOKA.—
11. PARRY SOUND.—

3. YORK, E.—
7. Markham.
8. Scarboro'.
4. YORK, N.—
9. Georgina and N. Gwillimbury
10. Gwillimbury, E.
11. King.
12. Whitechurch.
5. YORK, W.—
13. Vaughan.
14. York.
6. SIMCOE E.—
15. Medonte.
16. Oro.
17. Tiny and Tay.
7. SIMCOE, S.—
18. Essa.
19. Gwillimbury W. and Bradford.
20. Innisfil.
21. Tossorontio.
12. ONTARIO, N.—
26. Brock.
27. Mara and Rama.
28. Reach, Scugog and Port Perry
29. Scott.
30. Thorah.
31. Uxbridge.
13. ONTARIO, S.—
32. Pickering.
33. Whitby and E. Whitby.
14. DURHAM, E.—
34. Cavan.
35. Hope.
36. Manvers.
15. DURHAM, W.—
37. Cartwright.
38. Clarke.
39. Darlington.

5. The Judges shall keep a detail of marks awarded to each farm visited. They shall award to the best managed farm in each Township Society a bronze medal, where three farms have competed, and instead thereof to the best managed farm in the Electoral Division Society a silver medal, and to the best farm in the whole group a gold medal.

The Judges last year were John I. Hobson and William Donaldson ; and John B. Freeman and Francis Green, Jr., their valuable reports will be found also in our report to the Commissioners. The cost was $278.25. Judges for the coming year should be appointed at this session.

PRIZE ESSAYS.

A great many essays were written during the last year, fortunately some are printed in our report ; it is a pity that premiums were not offered this year ; it is not, however, too late if thought proper by the Council, and they might take into consideration that there will be little matter for our next year's report according to present plans.

ONTARIO VETERINARY COLLEGE.

This Association graduated 159 Students in 1889, under the tuition of Principal A. Smith, V.S., and his able staff of Professors.

44TH PROVINCIAL EXHIBITION.

This was held in the City of London, from the 9th till the 14th of September. The weather was everything that could be desired ; the attendance of farmers was very good, but that from the city itself, which appeared indifferent, or indeed antagonistic, was exceedingly poor.

As a stock exhibition it was very successful, second to none in the Province. We paid out in premiums $12,574.40 out of $14,703.00 offered ; our income, exclusive of the Government grant, was only $13,900.00, which with the grant of $4,000.00 made $17,900.00, while our expenses, including rent of ground and local committee grant, were about $10,000.00, leaving $4,674.00 of a deficiency to be paid from other funds of the Association. This year as you are aware no sum has been asked for to continue the Provincial Exhibition.

SPRING SHOW.

A grant has been asked for to establish a spring or fall show in this city, in connection with the Clydesdale Horse show, and it would appear advisable to make an effort to start this on a large scale in order to commemorate the centennial of the charter of the Province of Ontario, formerly Upper Canada.

WORLD'S FAIR AT CHICAGO IN 1892.

At your last meeting you recommended that Chicago should be the place to hold the above. I believe this is now decided upon, and to whom should the Province of Ontario look to, to collect and make a creditable show of live-stock, etc., if not to the Council of Agriculture, this will be occupation for the future; it need not be necessary to appoint Commissioners but the members of the Council might work up their own localities as was done for the Centennial at Philadelphia.

OFFICE WORK.

This has been very much the same as last year; more than 5,000 letters and post-cards have been dispatched in answer to correspondence received, besides the usual number of circulars, prize lists, etc., sent out for the Exhibition

H. WADE,
Secretary.

The Secretary's report was adopted.

A letter was read from Mr. R. Armstrong *re* prize farms, as follows :—

HULLETT, February 27th, 1890.

DEAR SIR,—I take the pleasure of writing you a few lines, wishing to know how the Agriculture and Arts Association are getting along. Please send me a report of last year's work. I competed for prize farm in last year's test in Huron; I live in East Huron district. I was the only one that competed I believe, and as I am a young farmer and the only one that competed for the prize, I think you might give me some prize. I would like if you could give me the bronze medal for my farm. It would help me to sell my farm, for I would like to sell, so Mr. Wade give me a lift if it is in your power, for it would increase the value of the farm about $500 if I had a medal to show them, for I believe it will become to be one of the first farms of Huron yet. Your judges told me at London fair that they recommended me for a bronze medal to your association. So if you can see fit to give me an honor for my farm it will be a great help to me to sell at an advance of price. I have a purchaser for it just now, so I would like to hear from you by return mail.

Yours truly,

ROBERT ARMSTRONG,
Lot 1, Con. 7, Hullett, Huron Co., Ont.,
Constance P. O.

P. S.—I wish you to let me know about the Dominion Associations of hogs and sheep, to be held on March 12th and 14th, and what the fare will be from Seaforth station.—R. A.

On motion of Mr. Dawson, seconded by Mr. Legge, it was decided to grant Mr. Armstrong a bronze medal.

Mr. Wade presented an application for an extended leave of absence during the coming summer, in order to take a trip to the old country.

On motion of Mr. Legge, the matter was referred to the Finance Committee for consideration.

A partial election of officers was then proceeded with, the result being as follows :—

President ....Mr. Rawlings.
Vice-President ....Mr. Vance.

Messrs. Vance, Drury, Awrey, Snell and Legge were appointed a committee to strike the Standing Committees.

The President, on taking his seat, thanked the members present for the honor of electing him to this high position. So far as he was concerned, he would rather have given the office to some other gentleman of the Association more suited to fill such a difficult position than he was. However, anything he could do to advance the cause of agriculture, his hearers might rest assured he would do.

Mr. Vance followed and spoke in similar strains.

The question of the salary of the treasurer, Mr. Graham, was next taken up, and in view of fact that hereafter his duties will be light on account of the abolition of Provincial Exhibition for at least some time to come, that gentleman was, on motion of Mr. Morgan, voted $100 per annum.

Subsequently an amendment was adopted, whereby the treasurer is entitled to receive $125 per annum, the extra twenty-five dollars being considered necessary to cover travelling and incidental expenses.

On motion of Mr. Legge, seconded by Mr. Snell, a hearty vote was tendered the retiring President, Mr. Rykert, for the admirable manner in which he presided over and carried out the affairs of the Association during his regime.

The meeting then decided to adjourn and resume business the following morning at 9.30 o'clock.

MARCH 14.

Business was resumed at 10 a.m.

President Rawlings presided, and there were present : Messrs. Ira Morgan, Joshua Legge, P. R. Palmer, Robert Vance, J. C. Snell, Nicholas Awrey, M. P. P., William Dawson, Hon. Chas. Drury, and D. M. McPherson, of Lancaster, who was not able to be in attendance on Thursday evening.

The report of Messrs. Drury, Awrey, Snell and Legge, who were appointed a committee to strike the standing committees, which showed the following nominations, was submitted as follows :—

Executive Committee—Messrs. Rykert, Snell, Simmons, Vance and Legge.

Finance and Printing Committee—Messrs. Awrey, McPherson, Morgan, Rowand and Palmer.

Stock Show Committee—Messrs. Rykert, Snell, Vance, Awrey and Simmons.

Herd Books Committee—Messrs. Drury, Snell, Rowand, Legge and Wade.

Shorthorn Committee—Messrs. Snell, Rowand, Dawson, Vance, Awrey and Drury.

Prize Farms Committee—Messrs. Drury, Snell and Vance.

Central Farmers' Institute Delegate—Mr. Legge.

On motion of Mr. Snell, seconded by Mr. Vance, the report as recommended was adopted.

The following communication was laid on the table by the Secretary, who explained a deputation was waiting outside to interview the council in regard to the matter contained in it.

GUELPH, 11th January, 1890.

W. WEST, ESQ.,
President Guelph Fat Stock Club.

DEAR SIR,—At the meeting of the above club held to-day the following committee was appointed, with you as convener, to wait on the Ontario Agricultural and Arts Association. This was done in view of the fact that the above association are going to hold a fat stock show this year, and it was thought that it would be advisable to try and induce them to come to Guelph, believing that should they do so, and hold their show here for the future, the Government might be pursuaded to build suitable buildings for the purpose of holding such shows. It will be your duty to ascertain when the association meets, and notify the members of your committee when you wish them to meet.

The committee consists of yourself, Prof. Shaw, Thos. Waters, and James Anderson.

J. W. EASTON,
Sec'y-Treas. G. F. S. C.

Mr. Anderson was the first speaker, and briefly outlined the scheme, and asked for the co-operation of the Association as set out in the communication. The speaker regretted the absence of Prof. Shaw, who was unable to be present with himself and Mr. Waters on account of an important business engagement. It was pointed out that good accommodation could be given in Guelph for the purposes under discussion, and if the Association decided to hold their show in the city of Guelph every inducement would be offered them in the way of assistance, etc.

Mr. Waters reiterated briefly what his colleague had stated.

The President made a few complimentary remarks, eulogizing the citizens of Guelph for their hospitality, and the town itself as a good show town, and after some further discussion the president informed the deputation that they would hear through the secretary the result of the consideration of the following resolution, which disposed of the matter in question.

Moved by Mr. Simmons, seconded by Mr. Legge, The question now before the meeting be referred to the committee on stock shows.—Carried.

The deputation then withdrew after expressing their thanks for the careful hearing they had received from the board.

The question of printing the report of the Central Farmers' Institute that is held in Toronto, together with and at the same time as the Agriculture and Arts Association's annual report, in order to make the information contained in the reports of the proceedings of these two institutions more easily accessible than it is at present, was brought forward by Mr. Legge.

This gentleman advocated this step on the ground that a larger amount of valuable information would be distributed among the farmers than they at present are likely to get.

The matter was discussed at considerable length by the president, Mr. Drury, Mr. Awrey, Mr. Simmons, and Mr. Legge, and resulted in being disposed of by the passing of the following resolution.

Moved by Mr. Legge, seconded by Mr. Simmons, That the President of the Farmers' Institute be requested to call a meeting of the Executive Committee to consider the advisability of holding the annual meeting in December, in order that the minutes of the institute may be prepared for insertion in the minutes of the Agriculture and Arts Association.

Mr. J. R. Martin of Cayuga, appeared before the board in order to obtain the members' opinion in regard to the shipping of cattle abroad. He had, during the past summer, visited the old country, and had come to the conclusion it was nothing short of a sin the way in which store cattle were being sent over to the United States. A large quantity of correspondence was laid before the council, the attached letter being a fair sample of the bulk of the information contained in it.

[COPY.]

FEBRUARY 26, 1890.

From W. S. FRENCH,
Redwood, Lorrha, Co. Tipperary, Ireland.

To J. R. MARTIN, Esq.,
Cayuga, Co. Haldimand, Ontario.

DEAR SIR.—Last August, at the Dublin Horse Show, the writer had the pleasure of discussing with you the subject of importing store cattle from Canada to this country. Perhaps you may be able to give me information on the following points: (1) At what rate per cwt. (112 lbs.) live weight, could (either 1 or 2 year old heifers or bullocks) cattle be shipped at your ports? (2) What would be about the average weight of each beast? (3) What would be the cost per head to Dublin or Limerick for freight, supposing a cargo of 100 to 200 head? (4) What would be the breed, Shorthorn, Polled, or Hereford crosses? (5) How would they have been fed, whether outliers or fed in yards or houses, and whether on hay, or corn, or cake? (6) Where could they be seen in case we sent over a representative from this country.

Yours truly,

W. S. FRENCH.

Post Script.—(7) What, in a general way, is the most favorable time for buying, spring or autumn? (8) What is the earliest time in spring that they can be shipped? (9) What is the cost of insurance to Dublin?

Mr. Simmons was of the opinion that the Association should discourage sending "stores" out of Canada. It was detrimental to the true interests of the country to encourage any such new branch of agricultural trade. It was not right for the Canadian farmers to have their store cattle fed in another country. It would be directly the duty of the board not to sanction anything of this sort.

Mr. Martin--There were at least 60,000 head of cattle went into the States in 1889.

Mr. McPherson strongly objected to the export of our lean cattle.

Mr. Simmons in a forcible speech condemned the shipping of cattle in a lean condition to any country. He had always been opposed to it, on the ground that it was ruinous to the true agricultural interests of the country and the duty of the association was undeniably to condemn anything of the sort.

The President followed in a similar strain.

The matter after some further discussion of an unimportant nature was dropped and Mr. Martin retired.

On motion of Mr. Awrey, seconded by Mr. Dawson, the prize farm judges, consisting of Messrs. Green, Freeman, Hobson and Donaldson, were reappointed.

The matter of Mr. Graham's salary referred to above was dealt with in the manner described.

The question of Mr. Wade's application for leave of absence was considered, and resulted in the following resolution:

Mr. Snell moved, seconded by Mr. Morgan, That the leave of absence asked for by the Secretary of this Association to visit England, the same be granted, and that this Association grant $200 to assist him while there for the purpose of visiting the agricultural and other associations, to collect reports and information that may be of advantage to the interests of this Association and agriculture and breeders associations of the Province of Ontario.

Mr. Wade thanked the members of the board in a few suitable terms for their kindness in granting him the request asked for.

On the suggestion of the president Messrs. Snell, Awrey and Drury were appointed a committee to meet with the Guelph people in regard to looking into the matter of accommodation for the holding a fat stock show there, and to report at the association's next meeting.

Moved by D. M. Macpherson, seconded by Mr. Dawson, That the money offered by this association to encourage plowing matches in the province, be divided into four parts of one hundred and fifty dollars each, and the sections comprising each division be as follows:—No. 1 division comprise one, two and three of the Agricultural and Arts Association divisions; No. 2 division comprise number four, five and six; No. 3 division comprise number seven, eight and nine; No. 4 division comprise number ten, twelve and thirteen; that the directors of each division be an executive committee in their respective divisions to superintend the expenditure of the grant for plowing match purposes.

Moved by Mr. Legge, seconded by Mr. Dawson, that the special committee composed of Hon. Mr. Drury, Awrey and President be instructed to arrange for a meeting to confer with the executive committee of the Short Horn Breeders' Association committee as to the proportion of the secretary's salary each association should pay, and report at the next meeting of this Board.

The motion was carried.

On the suggestion of Mr. Drury, a motion was passed instructing the secretary to correspond with the several State agricultural boards of the United States, for the purpose of obtaining informatien regarding the working of these associations which may be of importance to the association.

The meeting then adjourned.

MINUTES OF MEETING OF AGRICULTURE AND ARTS ASSOCIATION HELD IN AGRICULTURAL HALL.

TORONTO, September 16th, 1890.—11 a. m.

The following members were present:—Messrs. Rykert, Sissons, Vance, Simmons, Snell, Palmer, Legge, Dawson, Morgan and McPherson.

Mr. Vance in the absence of the President took the chair.

The minutes of last meeting were read and confirmed.

The following letter was then laid on the table:—

TORONTO, April 11th, 1890.

DEAR SIR,—I have the honor to state that I have deemed it my duty to resign my position as representative of Agricultural Division No. 13, on the council of the Agriculture and Arts Association of Ontario, and to intimate that Mr. Jonathan Sissons, of Crown Hill, is appointed to fill the unexpired portion of the term for which I was elected in January last.

Some time since I notified the different Agricultural Societies of the division of my desire to retire, and stated that if four of the societies would agree upon a representative I would appoint him to the vacancy. Four of the societies notified me that they desired the appointment of Mr. Sissons, and I have therefore carried out their wish in the matter.

Yours very truly,
CHARLES DRURY,
Minister of Agriculture.

Henry Wade, Esq.,
Secretary Agriculture and Arts Association.

Mr. Snell reported that he had written to Mr. Anderson *re* Fat Stock Show at Guelph, but was unable to make any arrangements as Mr. Anderson was away from home.

Messrs Hobson's and Donaldson's report on prize was then read as follows:—

To the Council of the Agriculture and Arts Association of Ontario:

GENTLEMEN,—Having been appointed judges in the prize farm competition in Group No. 4, and having very carefully inspected the different farms entered, we would recommend that the following prizes be awarded:—

York, North, Township of Whitechurch, Chas. J. Brodie, south half lot 13, con. 5, Bethesda Post Office ....Gold Medal.

Simcoe, East, Township of Tay, John A. Swann, lot 1, con. 7, Penetanguishene Post Office......................Silver Medal.

Simcoe, East, Township of Tiny, lots 88 and 89, con. 1, Chas. Rankin, Penetanguishene Post Office.................Bronze Medal.

Simcoe, South, Township of Gwillimbury, west, W. S. Fraser, south half lot 13, con. 5, Bradford Post Office..........Silver Medal.

Simcoe, West, Township of Vespra, Henry Parkhouse, lot 12, con. 1, Crown Hill Post Office ....Silver Medal.

Durham, West, Township of Darlington, Thos. Pascoe, lot 27, con. 5, Solina Post Office ....Silver Medal.

Ontario, North, Township of Mara, Richard Gaughan, north half lot 10, con. 9, Brichin Post Office..............Silver Medal.

JOHN I. HOBSON, } Judges.
WM. DONALDSON. }

Mr. Morgan moved, seconded by Mr. Rykert, that this council regrets to hear of the resignation of the Hon. Charles Drury as Minister of Agriculture, of Ontario, and also his resignation as a member of this board, he being for many years an active and useful member of this association, and taking always an active part in promoting the agricultural interests of this province. Carried.

Mr. Morgan moved, seconded by Mr. Dawson, that this association take the present opportunity to congratulate the Hon. John Dryden to his recent appointment to the position of Minister of Agriculture, for the Province of Ontario, as they consider it a fitting tribute and acknowledgment for the great interest he has always taken in promoting the agricultural interests of this province. Carried.

The meeting then adjourned till 8 o'clock in the evening.

Evening Session.

The same members present, with the addition of the President, Mr. Rawlings, in the chair. Mr. Awrey and Hon. John Dryden taking his seat for the first time.

A general debate took place as to the management and places for holding the plowing matches.

The different committees were appointed for management of same, and were requested to report results to the Council.

Moved by Mr. Legge, seconded by Mr. Snell, that whereas we, the members of this Board, have observed with satisfaction the comprehensive nature of the work in the grain and other field experiments which are now being conducted at the Ontario Agricultural College.

We also take pleasure in expressing our satisfaction with the careful manner in which these experiments are at present being conducted, and we are convinced that they cannot but prove of much service to the country. We are satisfied, however, that if these experiments on grain were confirmed by sowing them on exactly the same lines in other parts of the country their value would be very much increased to the farmers of this Province.

Be it resolved, therefore, that the President, Messrs. Morgan, Rykert, Snell and the mover be appointed a committee to wait upon the Minister of Agriculture at any early date to press upon his attention the necessity which exists for the adoption of some such scheme as that indicated in this resolution.

Moved by Mr. Dawson, seconded by Mr. Vance, that a Fat Stock Show be held this fall under the auspices of the Agriculture and Arts Association. —Carried.

Moved by Mr. Awrey, seconded by Mr. Dawson, that in view of the want of proper accommodation for the holding of a Fat Stock Show in the city of Toronto. Be it therefore resolved that a committee be appointed to confer with the Fat Stock Club of Guelph to see if satisfactory arrangements can be made to hold a show under the management of the two Associations, and that in case such arrangemants are made they be authorised to expend the sum of $300, and that said committee consist of Messrs. Snell, Simmons, Awrey and the Secretary.—Carried.

Moved by Mr. Awrey, seconded by Mr. Vance, that a committee be appointed to confer with the council of the city of Toronto as to proper accommodation being furnished by the corporation for the holding of a spring show of horses and cattle under the auspices of the Agriculture and Arts Association, and that in case satisfactory accommodation cannot be secured in Toronto that said committee be empowered to see if such accommodation can be secured from the corporation of either Hamilton or London.—Carried.

Moved by Mr. Simmons, seconded by Mr. Legge, that Mr. Sissons take the place of Mr. Drury cr committees.—Carried.

The meeting then adjourned.

REPORT OF THE JUDGES ON PRIZE FARMS FOR 1890.

To the Council of the Agriculture and Arts Association of Ontario:

GENTLEMEN,—After long and continued wet weather your judges appointed to inspect the farms entered for competition in Group No. 4 were fortunate in having a clear bright morning to begin our work.

The electoral divisions embraced in the competition are—Peel, Cardwell, East York, North York, West York, East Simcoe, South Simcoe, West Simcoe, Algoma county only, Muskoka, Parry Sound, North Ontario, South Ontario, East Durham and West Durham.

The follwing is the list of entries :—

Name.	P. O. Address.	Acres	Description.	Township.	E. Div.
John A. Swann	Penetanguishene.	117	lot 1, con. 7	Tay	Simcoe, E.
Charles Rankin	do	250	lot 88-9, con. 1	Tiny	do
R. A. Campbell & Bros	do	150	" 14, " 12	do	do
M. Cheverette	do	100	" s½ 13, " 17	do	do
Louis Cheverette	do	50	" 21, " 16	do	do
J. Machildon	do	100		do	do
W. F. Fraser	Bradford	100	" s½ 13, " 5	Gwillimbury	Simcoe, S.
Kenneth Cameron	Barrie	100	" e½ 17, " 7	Vespra	Simcoe, W.
Peter Knapp	Minesing	100	" e½ 5, " 10	do	do
Henry Parkhouse	Crown Hill	150	" 12, " 1	do	do
George McDonald	Barrie	110	" w½ 17, " 5	do	Barrie.
Chas. J. Brodie	Bethesda	100	" s½ 13, " 5	Whitechurch	York, N.
T. Baker	Solina	100	" 28, " 5	Darlington	Durham, W.
Samuel Allan	Bowmanville	155	" 1 & 2, " 2	do	do
Thomas Pascoe	Solina	100	" 27, " 5	do	do
Robert Stone	Evansvale	100	" s½ 12, " 10	Mara	Ontario, N.
Charles Sperin	Brichin	100	" s½ 11, " 9	do	do
Richard Gaughan	do	100	" n½ 10, " 9	do	do

On the morning of the 16th of June we left our respective homes by the early morning trains meeting in Toronto. At noon we left for Barrie. On reaching that town our first business was to put ourselves in communication with the livery stable man, for the purpose of arranging to be driven to the four farms to be inspected in the West Riding of Simcoe.

Leaving the matter in his hands we were first driven te the farm of George McDonald. On the way we had ample evidence of the loss resulting from the tremendous storm of the week previous. Sewers destroyed, large culverts completely washed out, embankments undermined, and great trenches made in the road,resulting in a loss to Barrie and the immediate neighborhood of, we were told from thirty to forty thousand dollars.

Mr. George McDonald's Farm, Township of Vespra.

On entering the above named farm we had on our left the nicely constructed two story brick house with verandah on three sides, the latter taking away that appearance of plainness sometimes noticeable in this class of house. In the front is a fairly good lawn with some ornamental trees shading it from the road. On the right of the private roadway is rather a pretty dell, which with the adjoining land to the extent of two or three acres has on it a good deal of fine timber adding much to the appearance of this part of the farm. Passing on and continuing along the private road we pass through the farm yard--this road leads up to within one field of the rear line of the farm and at this point turns off at a right angle giving access to the wood lot. This lot comprises 15 acres of good hard wood bush, leaving 95 acres under cultivation. The whole farm slopes gently to the south-west. The soil is a clay loam with a clay subsoil. The fences are mainly good substantial pine rail, the front being fenced with post and board. Along the road and side-line fences are fine rows of second growth timber, comprising cherry, maple and elm.

The principal crops grown are fall wheat, barley and oats. Land fairly clean, and crops medium. In stock Mr. McDonald is pretty well up—number kept rather few for the size of the farm, but the quality is good, in the herd of cattle are some pretty fair pedigreed shorthorns and a few steers to be fattened for next season's export.

Breeding roadster horses is somewhat of a specialty, those on hand indicate that Mr. McDonald understands this line of work—a two year old colt from Forrest Mambrino is exceptionally good and gives promise of developing into a fine showy horse.

Barn and homestead not quite up to the mark.

Having finished our inspection of this farm the next stage took us to farm of

Mr. Kenneth Cameron, Township of Vespra.

This farm comprises 100 acres and is situated three and one-half miles west of Barrie. On the way we drove for some part of the distance on a nicely shaded road, with the maple and the graceful elm forming an archway with their branches in many places meeting overhead. Again we saw evidence of the destruction caused by the waters of the recent flood—a bridge destroyed and a large piece of embankment carried away with the debris.

Reaching Mr. Cameron's we found him a good representative of the strong, hardy and intelligent men, who came many years ago from the mountainous districts of Scotland and who have played such an important part in making Ontario what it now is, the banner Province of the Dominion.

Although only 100 acres was entered for competition Mr. Cameron farms 300 acres, and judging from what we saw farms it well. The land appears to be of the same character, but slightly heavier than that owned by Mr. McDonald—the subsoil is also more retentive which accounted for the fall wheat being somewhat winter killed and patchy. In the matter of private roads and field arrangement good judgment has been displayed. Tillage pretty fair, and it is to be borne in mind in this connection that it is more difficult to keep a 300 acre farm clean and in show shape than a smaller one.

In regard to the system of cropping not much can be said, for the reason that the farm entered forms part of a larger one, and if the average of the crops were given it would not show proper proportions for a 100 acre farm.

In all sorts of stock as regards quality Mr. Cameron stands very high—the shorthorns show careful breeding and considerable individual merit. Sheep good and horses away up above those to be seen on farms usually classed as the homes of first-class horses. It is true that some of the horses we did not see as they were on the other farms, but those which were seen including a pair of magnificent brood mares would be no way out of place in a Toronto show ring, and showed plainly the class of animals bred. Mr. Cameron is an extensive and very successful exhibitor of the different classes of farm stock.

The weak point we would think in the farm management is in the small quantity of stock kept for the size of the farm. We would here say that that appears to be a noticeable feature on nearly all the farms visited in that part of the County of Simcoe in which our work lay as well as on those seen in the northern part of the County of Ontario.

It is a fact on which there is no room for discussion, that it is only a question of time when many of the strong lands in this and other parts of Ontario will be in a large measure unproductive unless some other system is followed—a system whereby in some way there will be returned to the land those elements of plant food essential to the profitable growing of farm crops.

However with this one exception in which with many others we think he is weak, it may safely be said that Mr. Cameron is a good farmer, a successful man, and a worthy representative of Ontario's most important industry.

Having taken our leave of Mr. Cameron we returned to Barrie for the night. The next morning we were on the road again at 6 o'clock, this time driving towards Crown Hill, the home of the Hon. Mr. Drury, late Minister of Agriculture. Our first stopping place was to be at the farm of Mr. Parkhouse, directly opposite. At starting all the conditions were favourable towards the work we had on hand being made enjoyable, weather fine, the road a pleasant one to travel on, a good team and an intelligent driver who knew all about that part of the country. Although there are not many parts of Ontario from the St. Clair river to the Province line of Quebec but what we have seen, yet seldom if ever have we travelled on a road presenting more beautiful views than were to be seen as we drove out of Barrie on this fine June morning. On the right we skirt Kempenfeldt Bay, one of the loveliest sheets of water of all the fine ones that our fair Province is so justly noted for.

As we look across the bay with the morning sun shimmering on its waters we see the little village of Allandale looking at its best. On the road which we are driving on are the homes of Barrie's richest and most prosperous citizens comprising many fine residences and tasteful surroundings.

As we leave the town and strike out into the country we find that we are into a much finer farming section than that traversed the day before. The farms with the generally well constructed homesteads give ample evidence of the prosperity of the owners. The road smooth and well made.

Mr. Henry Parkhouse's Farm, Township of Vespra.

Silver Medal.

As we came in sight of this farm we did not require to be told that this was the farm we had come to see. The snug looking and pretty dwelling house, the nicely constructed and extensive homestead, the well built and straight fences, the clean and finely tilled fields, and that general air of tidiness all marked it out as either a show farm or one that might well be entered as such.

On driving up to the house we found every one stirring round briskly and busy with their own particular work; cows being milked, teams going out to work on the summer fallow, calves being fed and Mr. Parkhouse superintending all.

This farm is known as Fairfield; it comprises 150 acres, of which 110 acres are cleared and 93 free from stumps, the balance of the cleared land is kept in permanent pasture until such time as the stumping machine has done its work. The soil is a strong clay loam, inclined to be stiffish, and judging from the stump fences must at one time been covered heavily with pine timber

The system of rotation which has been found suitable for the soil is to break up sod in the fall to be sown with peas the following spring, this is followed with fall wheat, then one or two crops of oats—after that summer fallow on which is sown fall wheat, seeded down—timothy being sown in the fall and clover in the spring—generally cut two crops of hay and pasture one year before breaking up. Although the above course is generally followed a change has sometimes to be made though not always getting a good catch of grass. The mode of working the summer fallow is to plough deeply in the fall, after seeding the following spring plough again, harrow and cultivate, and after lying a week or two put on manure and plough in before haying—plough twice after this and harrow and cultivate thoroughly, the ploughing the last time is done in fifteen and one-half feet lands, the wheat being drilled in across the lands about the first week in September.

Not much is done in growing roots, about one and a half or two acres being the average quantity raised, for these the manure is put on in the fall.

Mr. Parkhouse is a strong believer in the importance of putting plenty of work on the land, besides working the summer fallow thoroughly, a good deal of work is put on the stubble lands in the fall—whenever a field shows any sign of becoming dirty it is ploughed up as soon as possible after harvest and worked well with cultivator and harrows preparatory to being ploughed up later in the season.

The method of preparing the land in the spring is to plough with either the single or gang plough all which has any thistles or weeds in it, the clean land is cultivated and harrowed before drilling, and if dry enough the roller is used after being sown. While we have spoken of the plan followed for keeping down thistles and weeds it will be readily understood from what we have said about the system of tillage that this is a very clean farm, the aim being more to keep the fields from becoming foul, rather than in letting them become dirty and then going to work to clean them.

About 200 rods of underdrains have been put in and considerably more is yet to be done.

For the work of the farm two teams are kept, in addition to these is a brood mare.

From fourteen to eighteen cattle comprise the average herd ; four calves are raised annually and from five to seven cows are milked. Three or four are fattened. Ten or twelve sheep are kept and a few pigs.

Considering the size of the farm and the nature of the soil we think that this is rather a weak point in the management ; it is true that Mr. Parkhouse has succeeded in growing good crops and we are quite sure that he has been a very successful farmer, and carries on his work in a most intelligent manner, but we also feel pretty sure that it is owing largely to the thorough working of his land that he has not already found it weakening from the want of not keeping more stock, and we think it is only a question of time when he will find it necessary to return to the soil in some shape more nearly an equivalent of what is taken off.

The field arrangement is exceptionally good. A private road runs from front to rear of the farm, this road is straight, well fenced on either side and is kept neat and trim. A row of fields on either side open on to this road; the fields with the exception of two are of a uniform size of ten acres, of the two, one between the public road and the dwelling house is six acres, and the other from which the buildings, yards, garden, etc., are taken in seven acres.

The fencing is very good of its kind. On the public road is a picket fence—the two line fences on either side are stake and rail, the dividing fences and those on either side of private road are wire, straight rail and stump, and as already said all very good of the sort—of wire there are 140 rods, and picket 105 rods.

The dwelling house is built of brick and looks well from whatever point it is viewed—it is 24 x 36 with kitchen 20 by 22. There is also a summer kitchen and woodshed and workshop, the latter being 20 by 44.

The outbuildings form four sides of a square, with the yard in the centre. On the north side is a barn 40 by 60, attached to this on the east end is a driving shed 22 x 40, on the west end a cow stable 22 x 44, with stalls for 20 cattle. On the west side of the yard is a barn 36 x 60 with sheep house 14 x 36, on the south end. On the south side is hen house. Stable with loose boxes for colts or cattle and closing up the balance of this side is an open shed 20 x 44. On the east side is a horse stable 20 x 36 with stalls for 8 horses, next to this is an open shed 40 x 36 with hay loft above, at the end of this building and between it and a pig pen 16 x 20 is the main entrance to the yard.

This is an exceptionally well cultivated farm, and great intelligence as well as a thorough knowledge of the best way of carrying out every detail is observable on every hand. Men like Mr. Parkhouse do much good in any neighbourhood. We believe that there is no power more forcible than example can be brought to bear on the careless and indifferent, and men like him are perhaps exercising more influence in bringing about a higher system of cultivation than they themselves are aware of.

A long drive was now before us, our destination being the village of Minesing. On account of the many wash-outs it was necessary to make a good deal of inquiry as to the best and safest way of getting there. Passing through Crown Hill we drove by the way of the little hamlet of Midhurst. Crossing the dam which supplies the power required for producing the electric light at Barrie and climbing a somewhat steep hill we suddenly struck on to a worthless sandy plain —so poor as to be utterly worthless for farming purposes. It had originally been covered with pine but is now all cleared, with the exception of the refuse of the timber left lying around, and in some places small patches of scrubby, second growth pine. This land, covering a large area, is not considered worth fencing, and is left lying in common. Crossing this sandy plain for two or three miles we come to where the land begins to fall to what is known as the Minesing flats. Just at the point where the level land terminates the soil changes to a strong clay. Crossing the flats close to Minesing station we again work up a very long and steep hill until we reach the high land forming the water-shed between Willow creek on the one hand and Nottawasaga river on the other. As we drive along this road a fine view is to be had of the country beyond the last named stream—farm after farm until the eye rests on the rising ground in the adjoining Township of Flos.

Mr. Peter Knapps, Township of Vespra.

Three miles from the R. R. Station of the same name is the village of Minesing, adjoining which is the above named farm. This farm comprises 100 acres; it was bought by the present owner six years ago for $8,000. The price appears to be high but when we consider the exceptional producing power of the land it is not by any means a dear farm. The situation is good, being close to churches, school and blacksmith shop. The natural advantages are strong productive clay soil, which mellows down and works easily when exposed to moisture. The subsoil is clay, but not retentive, the water passing away readily and it slopes just enough to the north and west to give good natural drainage. A look at the growing crops was enough to show us that they did not suffer from want of natural or artificial drainage. The fall wheat, 27 acres, was level, even and strong; a 12 acre field of peas and oats mixed would give a very large return. Besides the fall wheat there is usually a few acres of spring wheat grown, this year about three acres. The impression left on our minds was that, making due allowance for the rich, strong land, yet if Mr. Knapp continued the same system of heavy cropping it would not take many years before it would require less barn room to hold the produce of the farm.

We are sorry that we cannot give a more full report of this farm, the reason for not doing so is that we were very much hurried at the time we were there, being anxious to get back to the station to catch the train for Penetanguishene; if we had not done so a whole day would have been lost. Mr. Knapp was written to, asking for full particulars regarding his system of cropping, stock kept, mode of tillage, etc., but up to the time of writing no answer has been received.

Getting back to the station we took the train for Penetang. At this place there was a great deal of work laid out for us. Six farms to be seen in the townships of Tiny and Tay, and so situated as to require a great deal of driving. Five of these farms were in the township of Tiny. To make matters worse there had been a greater run than usual on the livery stables and we soon found out that we either had to loaf round the remainder of the day or else allow ourselves to be imposed upon: we chose the latter course.

We would say that we consider it wrong to expect judges to inspect as many as five farms in one township. It would surely be better for the directors of the local agricultural association to select the three best. That could, in most cases be done without even putting them to the trouble of a personal inspection. Not only does it entail a great deal of unnecessary work on the judges but it adds very materially to the cost.

From Penetanguishene we started with a pair of used up old horses and a lumbering looking rig with a seating capacity for nine. This "machine" we were told was constructed specially for the purpose of bringing to church on Sundays the governor of the Reformatory and his family. One of your judges looked back as we were leaving the hotel and had the satisfaction of knowing that although the conditions were not by any means favorable in the way of having an enjoyable drive, yet the mode of our departure was causing a good deal of amusement to those who were taking in the start.

For six miles after leaving the town we saw nothing but poor and very stony land, with an occasional stretch of worthless sand. It is no exaggeration to say that in that distance we did not pass 100 acres of good tillable land. However when we came to where the land did change for the better we all at once got amongst good farms.

MR. MOSES CHIVERETTE'S FARM, TOWNSHIP OF TINY.

Looking over Mr. Chiverette's farm we found there was nothing to be said about it which would be of any value to the readers of this report. The next farm to be seen was that of Mr. Louis Chiverette: this we found to be only half the acreage called for, so not being eligible for competition we did not waste time looking over it. Again taking the road we drove through what is known as the French settlement and after about an hour's driving reached the farm owned by

MR. C. MACHILDON, TOWNSHIP OF TINY.

This we found to be a first-rate 100 acre farm, strong clay loam, and no doubt fairly well farmed, according to the system followed in the neighbourhood. A system, however, which your judges found to be in no way in accordance with their ideas of high-class farming. The next farm to be seen was lot 14, con. 12 in the same township.

MR. CAMPBELL'S FARM, TOWNSHIP OF TINY.

This farm is situated four miles west of Penetanguishene and contains 150 acres. The soil is clay loam with a fairly good subsoil. It is all cleared of timber, but like many others in this part of the township, has upon some parts of it a good deal of stone: but taken as a whole, may be classed as a fairly good farm. The water supply is from wells and soft water cistern. Buildings are large and roomy and well adapted for the requirements of the farm. Included in the homestead are two bank barns, one being 100 feet by 40 and the other 60 by 30: these giving ample accommodation for all the stock kept on the farm. The dwelling house is brick, a story and a half—a useful looking farm house.

The average number of cattle kept is about 40. The line of farming followed by Mr. Campbell may be classed as mixed husbandry, including grain growing dairying and raising of vegetables and small fruits for the market. In future market gardening is going to be gone largely into. This gentleman's sons are engaged extensively in that business in Midland and this farm is going to be run in connection with it.

The farm may be said to be in a transition stage from ordinary farming to the line already spoken of and for that reason not in the best shape for competing.

Leaving Mr. Campbell's, thoroughly tired and feeling that we had put in a solid day's work, we started on our way back to Penetang for the night, and pleased we were when we alighted from our lumbering old rig at the hotel door.

The next morning our road lay by the way of Tindall's lake, then forward to Wyebridge. On the outskirts on the high ground overlooking the last named village we passed a " wee log Presbyterian church," which has outlived its uses. Its people have gone down into the valley and raised another church in which they worship. It was pleasing to us to see the old building left standing as a momento of the early days of the settlement, when our fathers were more primitive in their habits than are their sons of to-day. Even the village boys respect the old building, for not a pane of glass was broken in its windows.

SPRINGFIELD FARM, TOWNSHIP OF TINY.

Bronze Medal.

Shortly after leaving Wyebridge we came to the above named farm, owned by Mr. Charles Rankin. It contains 250 acres, is divided by the Penetang and Barrie road, the dwelling house being on one side of the public road and the barns on the other. The house is a very pretty two story brick building, tastefully furnished. The grounds adjoining are nicely laid out, well kept, and have in them carefully selected evergreens and other ornamental trees. On the south side of the house and grounds is the private road, and on the opposite side is a well stocked orchard of thrifty looking trees. Gardens, orchard and grounds are surrounded by neat and nicely painted fences, giving to the whole a pleasing and cheerful look. The barns and other outbuildinge, as already said, are on the opposite side of the public highway; these buildings are partly bank and have been at one time painted. They look well at a distance and that is all that can be said favourably about them. At one time, when new, no doubt they were a fairly good lot of buildings; now they are much out of repair.

The management of the manure, like that on every farm we have visited in this riding, is, to put it mildly, *bad*: the weak point being in allowing it to lay scattered around to be leached with the rains until it is almost worthless. We would like to emphasize what we have often said before in regard to the carelessness of many farmers on this line. Judging from observation in all parts of this province we do not think we put it too strongly when we say that if all the farmers of Ontario were to be as careful in saving what manure is made and in increasing the quantity and improving the quality as many of our high-class farmers now are, that it would more than pay the interest on all the mortgage debts of the farms in Ontario. It is quite incomprehensible why many an otherwise fairly good farmer will be so careless in this respect.

Of the 250 acres owned 75 is hardwood bush. Soil and subsoil clay, with an occasional mixture of black loam.

The fences on the public road are post and board, inside fences partly straight board, balance rail. It may be set down as a fairly well fenced farm.

The growing crop gave indication that the land is strong and the field culture good. Some pretty good short-horns were to be seen grazing in the pastures, besides a small herd of pure breds twenty or thirty grades are usually kept. From thirty to forty sheep is the average flock. Nothing done regularly in the way of fattening either sheep or cattle.

Balancing up the strong and weak points of the different competitors in the Township of Tiny we consider Mr. Rankin entitled to the Township Prize.

MR. JOHN A. SWANN'S FARM, TOWNSHIP OF TAY.

Silver Medal.

Leaving Mr. Rankin's and going by the way of Waverley and Vasey, and after having done five hours driving, we were very glad when our driver proclaimed the welcome news that we were within sight of the farm. However, although tired with our long drive, we had the satisfaction of knowing, after taking a glance around, that we had struck a farm owned by a real live and progressive farmer, and the more we looked over it the more satisfied we were with all we saw.

Mr. Swann, as regards the position he takes, is, strictly speaking, a self-made man. Nineteen years ago he came to the farm he now occupies, with little else to start with but good health, industrious habits, indomitable pluck and that intense desire to excel, which characterizes the highest and best type of the Ontario farmer.

Mr. Swann is now the owner of 300 acres, not only that, but he lives in a comfortable house, built at a cost of $3.000., and with not a cent of mortgage on any of his land.

The situation of the farm may be described as being on the town-line between the Township of Tay and Medonte—17 miles from the town of Midland. The part entered comprises 117 acres, 21 of which is hardwood bush. The soil is sandy loam with clay subsoil. The arrangement of fields and private road is very good. The water supply is from wells at the barn yard; access to it is had by the private road—gates opening out of all the fields. An exceptionally well kept vegetable garden, in which was to be seen all the ordinary vegetables well forward for the season, was a noticeable feature in this well managed establishment. This, with its neat fences and trim surroundings, gives an air of thrift and order and is further evidence that Mr. Swann is not only a good farmer in the ordinary sense in which that term is used, but a man of first-rate executive ability, capable of keeping abreast of his work in every line, as well as showing a desire to make life enjoyable for those dependent upon him. We speak in this way for on many a farm we have visited we have seen the best efforts of the farmer so directed towards making money and his mind so concentrated on that one line that no thought was given to anything else.

Attached to the house is the roomy woodshed with the season's supply of wood neatly piled away, the soft water cistern and every little convenience which in the aggregate have so much to do in reducing to a minimum the work required to be done in the house.

The homestead is fairly good, but not up to the standard of the best class of farm buildings. However, there is this to be said about it, everything was in good order and well attended to, not the slightest sign of slovenliness anywhere; and when we are dealing with a question of farm management and not long purses we must not overlook the fact that, all things considered, Mr. Swann has been wonderfully successful and that it might be a little too much to expect that, with all his other achievements during the last nineteen years, that he ought to have been able to pull down his barns and build new ones.

In a general way the system of cropping may be described as follows:—One-third of the cleared land in grain and hoed crops, one-third in meadow for hay, and the balance pasture. The grain crops comprise fall wheat (of which not much has been grown of late years) spring wheat, barley, oats and peas, usually take three grain crops and mow twice. Considerable is done in growing turnips. Manure is applied on the turnip and wheat land. The tillage appears to be very thorough.

As there was a great deal of pine on this land it has required much labour to stump and clear the fields. At the time of our visit one field had all the stumps lying on the surface, cleaned and ready to be used for fences.

Upwards of 30 cattle are kept, 10 of these are milch cows, the milk being used at home for making butter. The calves are mainly raised on skim milk. All surplus stock is fattened and sold at such times as Mr. Swann thinks the greatest profit can be realized. In this connection it must be borne in mind that the farmers in this part of Ontario are placed at a disadvantage relatively with those in localities where winter fattening is carried on extensively. It will invariably be found that where the farmers of any given section go largely into any line of stock keeping, whether it be raising heavy horses, thorough-bred cattle, or fattening of stock, there will be found the buyers in the greatest numbers and the highest prices paid.

At the time of our visit the flock of sheep consisted of 47 sheep and 41 lambs, these are a cross between Cotswold and Leicester. Last year $273 was received for sheep and wool sold. A good deal is also done in raising and fattening pigs.

In conclusion, we would sum up by saying that the farm was comparatively free from thistles and weeds, the crops good, the fences strong and well built, the buildings, with their surroundings, trim and tidy, the water supply so arranged as to be convenient both for buildings and fields, the stock management profitable, and when we consider that all Mr. Swann now has is the fruit of his own labour, skill and energy, with the blessing of Providence, we feel that he well deserves the silver medal for the best managed farm entered for competition in the East Riding of Simcoe.

Our work of inspection being over, and having been hospitably entertained, a glance at our watches and a look at the time-table made it clear that if we were going to catch the train for Orillia no time must be lost, so we were quickly on the road—and a rough one it was—making the best time we could for Victoria Harbour. Reaching Orillia early in the afternoon, and after making enquiries in regard to the location of the three farms to be visited in the township of Mara, we found that nothing would be gained by starting work before the next morning. This did not in any way trouble us as we thought we had well earned a few hours' rest, if rest it could be called, discussing what we had done, and in getting up with arrears of work in the way of writing up notes, which is not an easy matter to keep well forward with when the time from early morning until late at night is spent on the road and looking over farms.

Mr. Robert Stone's Farm, Township of Mara.

Next morning we left for the above named farm, situated 12 miles east of Orillia. Leaving the town we drove for about three miles having Lake Simcoe with its pretty islands on our right, and with an occasional glimpse of Lake Couchiching on our left. At Atherly we crossed the Narrows on the swing bridge. At this point the two lakes connect by means of a channel dredged sufficiently deep for the passage of vessels. From Atherly we drove by the way of Uptergrove, over wretched roads, and were in no way sorry when we reached our destination for the time being

Mr. Stone exhibits at a great disadvantage this season on account of a large part of his land lying very low. Owing to the excessive rainfall the fields were covered with water at a time when the crops would have been sown in a more favourable season. As a consequence the crops were quite backward and very much injured by excessive moisture.

We found the arrangement of fields convenient, fences strong and substantial, fairly good frame house, and an exceptionally fine bank barn with the stables well fitted up.

The strong point on this farm is the stock management, Mr. Stone having displayed considerable enterprise in introducing first-class cattle into the neighborhood. The herd of Shorthorns comprises eight good well-bred animals, including an exceptionally fine heifer calf. Besides what is done in breeding Shorthorns, from ten to fifteen cattle are stall fed in the winter. This spring six were sold for exportation which realized $515. As might be expected on a farm where stock-raising is made a specialty, the system of farming differs from that carried on by those living around who do little in that line. Here we found turnip-growing a leading feature, from eight to ten acres of roots being grown annually. Another strong point in Mr. Stone's management as compared with that on most of the farms visited this season, is the care exercised in the making and preservation of manure. It is mainly kept under cover in a large manure house, and from there drawn directly to the fields. As all straw grown on the farm is passed through the stables either as feed or litter, the quality is good. Now we do not wish it to be understood that we advise the use of manure houses; on the contrary we are rather in favor of manure being kept ohtside *that is when properly managed*, but unfortunately by many of our farmers it means untold waste.

In conclusion, we would say that while Mr. Stone is strong in some departments—and those important ones—of farm management, yet there is that roughness about the farm and weakness in tillage, and, we may add, that lack of neatness all around, from the surroundings of the homestead to the rear line of the farm, as to preclude him from coming in as a prize winner.

Mr. Charles Speirin's Farm, Township of Mara.

From Mr. Stone's we drove to Mr, Charles Speirin's. The owner of this property is a busy man, for, although only 100 acres was entered for competition, yet, in addition to this, there is 300 acres more farmed along with it, and besides farming Mr. Speirin runs a saw mill.

The soil is a strong clay loam ; the land appears to be fairly well tilled ; the buildings comprise a first-class dwelling-house and large and useful looking barns and outbuildings ; the fences pretty good : cattle, judging by those we saw, a fair average.

Mr. Speirin, we have no doubt, is a pushing, energetic man, and belongs to that class who generally exercise an influence in any neighborhood : but carrying on such an extensive business has prevented him from concentrating his efforts sufficiently on the farm entered as to put it into the shape necessary to entitle him to a prize.

Richard Gaughan's Farm, Township of Mara.

Silver Medal.

A seven mile drive from the last farm should have landed us at Mr. Gaughan's but, owing to our taking a wrong turn, twelve miles had to be driven before we pulled up at the last place where our work of farm inspection had to be done in this county. One of your farm judges, who is possessed with a sort of chronic uneasiness at all times when driving on strange roads for fear that the driver is not well up in the bearings, and who during the time we had been out, would, if the driver had taken his advice, led us twenty times in the wrong direction, seemed very much pleased when he found at last that a mistake had been made, and when there was no denying the fact that for once it would have been to our advantage if his advice had been taken. The farm entered comprises 100 acres situated two miles north of the village of Brechin. Besides this farm Mr. Gaughan has added to it by a late purchase an adjoining 100 acres, and has also under occupation another rented farm of the same acreage, making in all 300 acres.

The soil is clay loam, with a porous sub-soil. The buildings are a fair lot, situated close to the line of the last purchase, making them quite convenient for the enlarged farm. It looks somewhat like if Mr. Gaughan had an eye on that farm when they were located.

The system of cropping is to break up sod and sow with peas, followed generally with wheat, then barley, after that oats seeded down. A good deal is done in summer-fallowing ; on this the manure is mainly applied. Not much done in growing roots. Although on this farm no regular rotation is followed, yet there does not appear much to find fault with as regards field management, that is, judging by results, and in making our awards we have been always guided largely by that. It appears to be a very productive soil. The farm has been all underdrained. Cultivation is thorough, and as a result all the available plant food in the soil goes to the production of the crop desired, and is not drawn upon to produce thistles, mustard, or wild oats. We do not say that Mr. Gaughan's system as practiced in the past is all right. He tells us that he has taken as many as six crops of wheat in succession off one field, and every crop, we were told, was a good one. However, this is to be said, that the soil does not show indication of being in any way impoverished, on the contrary, as far as we could judge, the farm had the appearance of being in good heart, and the land clean and free from weeds, and unquestionably Mr. Gaughan has been and is a money-making farmer. From 500 to 700 bushels of barley are grown yearly. In 1888, from 54 bushels of seed sown 1,100 bushels were sold and enough kept for seed the following season. A strong feature is the intelligence displayed in breeding horses. At the time of our visit a fine lot of colts were on hand, as well as some extra good brood mares, one pair of the latter turning the scales at 3,200 lbs. Mr. Gaughan confines his breeding entirely to Clydesdales.

The returns in the way of sales are mainly from grain and horses, very little being done in raising or fattening other farm stock, with the exception of pigs, of which about fifteen are fattened annually.

Now we know quite well that some readers of this report are likely to take exception to this style of farming and say that it is exhaustive. We would agree with them, and say that although Mr. Gaughan has been a money-making farmer, yet the time will certainly soon come when it will be necessary to make some change in his method of farming whereby there will be returned to the soil in some way those elements of plant-food which have been so heavily drawn upon. The secret of success so far, no doubt, has been a strong soil well under-drained, thorough cultivation whereby plant food has been made available for the growing crops, and none of it being drawn upon to produce weeds.

Buildings not quite up to the mark, and a little more work on the fences would not be amiss. However, with these drawbacks Mr. Gaughan well deserves the silver medal.

Getting back to Orillia, we left by the evening train for Barrie. Next morning an hour's run brought us to Bradford. Here we were met by Mr. W. F. Fraser, who, knowing of the time of our expected arrival, had come for the purpose of driving us to his farm.

HELMSDALE FARM.

Silver Medal.

Mr. Fraser is a highly intelligent man and a good talker. This made our three miles drive very enjoyable, all the more so as we drove through a section where good farms seemed to be the rule, and at a time when grain, field, meadow and forest are seen at their finest. So pleasant and enjoyable was the drive this fine morning that it caused us to look at farm judging in a very different way to what we had done when driving to our night's quarters over horrible roads after a hard day's work around Penetang.

Helmsdale farm is about three miles from Bradford, in the Township of West Gwillimbury. It is situated on the margin of the flats through which the Holland river creeps slowly to the waters of Lake Simcoe. We were told that nearly seventy thousand acres of land of inexhaustible richnesss would be brought under cultivation by lowering the waters of this lake three or four feet at a cost of less than one dollar an acre of the land reclaimed.

The farm contains 300 acres, only 100 of which was entered for competition. It is a clay loam with heavy clay sub-soil, slightly rolling and sloping to south and east. The low and what were wet places have been drained with tile. A low-lying field which was summer-fallow when we were there was at one time a dense cedar swamp. This has been underdrained, the drains being put five or six rods apart. It is now dry enough to produce good crops of fall wheat. All the drains converge to one point from which a large open ditch, three-quarters of a mile long, conveys the water to the river.

It is partly sheltered to the north by a grove of maples; besides this considerable planting has been done. Particularly noticeable is a fine row of Norway spruce. planted two years ago, along the northern boundary. This, if properly attended to, will soon prove a valuable wind-break as well as a pleasant feature on the landscape. The farm is divided into fields of from ten to twelve acres, all of which open on to the private road which runs through the centre of the farm. On either side of this road is a row of healthy looking and well grown maples.

The fences were in good repair, and include quite a variety in style including the common stake and ridered, post and rail, post and board, and Russell fence.

The acreage of crops were fall wheat, 15 acres; spring wheat, five acres; barley, ten; oats, sixteen; peas, ten acres; and clover and timothy, 18 acres. There were no roots on the farm entered, they being on the other portion of the farm. The average yield of fall wheat for the past five years has been 26 bush. an acre and spring wheat 12 bush.

Wheat and barley are the only grains sold off the farm. The coarse grains are all fed to the stock, as well as all the hay grown.

The cattle—a very good lot—numbered twenty-two. They are Shorthorns and grades. Six of these are milk cows. The milk is used at home for making butter.

The calves are fed on skim milk with ground flax seed. This is supplemented, as soon as they can be taught to eat, with whole or crushed oats. During the hot weather they are stabled through the day and turned into pasture at night.

Two pair of useful-looking horses are kept for the work of the farm, and something done in breeding. At the time of our visit a brood mare with four of her colts were in the pasture. These were a lot of well graded up Clydesdales—and good of their class. The flock of sheep comprises twenty pretty well bred Shropshires. Mr. Fraser tells us that for a number of years past his ewes have averaged at the rate of about three lambs to two ewes. About 18 or 20 pigs are annually raised and fattened.

Mr. Fraser believes as a farmer in drawing his profits from many sources, so here we find, as well as the ordinary stock of the farm, turkeys, geese and bees, each contributing in some degree to the profits.

The dwelling-house is built of brick and is 28 x 38, with frame kitchen and wood-shed attached.

The barns are built in the shape of an L, the larger one being 111 x 36 with 18 ft. posts and stone basement in which is ample stable room for horses and cattle. The horse stable is divided from the cattle stable by a stone wall. The stalls are paved with cedar block. In addition to the stalls are six loose boxes, making altogether very convenient and useful stables. For feeding a large shute conveys the hay to a central place in the stables below. The other food required is also brought down by shutes to where it is required for use. The root-house is convenient to the cattle stables.

Another barn 55 x 35 ft. has under it the sheep-house, the latter being open to the south. The hog-pen and hen-house is 18 x 35 with hewed cedar floor. A large implement house with loft for tools and small articles makes a good and useful building for protecting the implements and tools of the farm from sun and rain. Completing the set of buildings is one in the lane used for carriages cutter, etc.

The barnyard is enclosed, sheltered on all sides excepting the south. The manure is used on the summer-fallow and for the root crop. A great deal of attention is paid on this farm to the proper management of the manure, as little as possible being allowed to waste. With this end in view absorbents are freely used for the purpose of saving all the liquid manure made in the stables, Mr. F. fully realizing the importance of not losing this the most valuable portion.

The kitchen garden is large and so arranged that the labor can be done largely by horse power. This is an excellent plan, and should be much more commonly followed by farmers than it is. There is no reason whatever that farmers' families should not have the full benefit of a plentiful supply of all the various sorts of vegetables and fruits for which our soil and climate are suited. None could grow them as cheaply as farmers if they went about the work in a right way ; and from what we know we have no hesitation in saying that it is the rare exception to find a well stocked farmer's garden

To go back to Mr. Fraser's garden. The strawberries, raspberries, and vegetables were in a flourishing condition, planted in rows extending the whole length of the garden, and far enough apart to admit of the working of a horse-hoe freely.

An old orchard showing signs of decay is being replaced by a young one of more promising appearance.

Mr. Fraser we consider a first-class farmer, a good all-round man, not specially strong in one department and weak in some other, as we often find to be the case. The most minute details, as well as the more important, are closely attended to. There is, however, in the matter of freeness of thistles in some of the fields, room to take exception when compared with the gold medal farm, but even making allowance for that, Mr. Fraser, as a farmer, stands high when compared with even the best class of farmers in Ontario. Having finished our inspection we were driven back to Bradford, our obliging host taking us this time by a different road, giving us an opportunity of seeing more of this splendid farming district.

Taking our tickets for Newmarket, we found on reaching that town that we had a ten mile drive to the next farm on the list. As this meant in all a twenty mile drive, with time enough at our disposal to examine well the farm we were going to see, and it being between 1 and 2 o'clock before we could leave, it meant that we would have to make good time if we were to get back so as to catch the evening train. This being stated to the man from whom we hired the team, he said it would be all right as far as his part of it went, and so it was, excepting that we went just a little faster than either of us liked, with a kicking match by one of the horses by way of variation. We were both heartily glad when we got out of that rig for the last time.

CRAIGIEBURN.

To which was awarded the Gold Medal.

This splendidly managed farm is lot 2, con. 5, Township of Whitchurch, and is owned by Mr. C. J. Brodie. It comprises 100 acres, of which six acres on the north-east corner is a hardwood bush. The soil is strong clay loam well underdrained. A private road runs up the centre of the farm, opening into the wood lot at the rear. This is one of the best made and kept roads that we have seen on any farm that has at any time come under our inspection. The fences on either side of this road are what are known as straight rail, that is, a strong cedar post is set at the end of each panel and an upright piece is fastened to it with wire; the ends of the rails here join. These fences were beautifully made and as straight as a surveyor's line. Good and well-made gates open into a row of fields on either side. The roadway is nicely rounded, just sufficient to prevent the water in wet weather from lying on it. Along the public road is a well built wire fence, as also some of the shorter ones about the buildings and small enclosures. The rest of the fences are cedar rail with upright stakes fastened with wire.

What took our attention amongst other things when walking through the farm, was that not a stone, stick or rubbish of any sort was to be seen either on private road, field or fence corner; what stones had not been used were all drawn into a pile at the back of the farm adjoining the wood lot. But what we did see were fields absolutely clean and free from thistles and all other noxious weeds, good and even crops, a twelve acre field of roots which gave unmistakeable evidence that Mr. Brodie has a decided liking for going the nearest way across a field, and here and there a fine shade tree.

Considerable has been done in planting Norway spruce which in a few years will be both ornamental and answer a good purpose as a wind break.

The homestead comprises a barn 100 feet long by 54 wide placed on a stone wall twelve feet high It is built on the end drive principle but differing from end drive barns in having in addition the side drive which is twenty feet from one end. The advantages of this are, it admits of the engine when threshing being set at the side and the end mows threshed out first, leaving them to hold the straw when the engine is set at the end and to make it cleaner for threshing.

The mows are 20 feet square, arranged at each side of the central drive which is 14 feet wide. A movable rack lifter serves to fill to the roof each mow in the barn. The granary is 20 feet square and is situated at the south side of the main drive in the central part of the barn. Trap doors for putting down feed and bedding for the horses and cattle are in the most convenient places.

The stone wall, 12 feet high, is above ground and the stables are dry and airy. Stables and root cellar occupy the whole space.

The horse stables are in the west 40 feet, the box stalls for stallions, colts and mares being most remote from the door leading into the barn yard at the south side of the building, the stalls for work horses being arranged from west to east nearest the door.

The floors are block paved. The cattle stables occupy the other portion, with the exception of the root cellar which is 40 feet long by 20 wide, placed at the north and central part of the stable. The box stalls for bulls, calves, etc., and the stalls for cows and steers are arranged so as to be as convenient as possible with due regard to economy of space. The floors are made of Portland cement. The feed rooms are as nearly central as they could be made, thus reducing the work of feeding stock to a minimum.

The arrangement of the water supply is exceptionally good. An inch stream of fresh spring water runs into a trough in the barn yard a few feet from the horse stable doors, thus the stock have a plentiful supply at all times. A pipe runs up the bridge or driveway at the end of the barn and supplies water for threshing, while another runs into the stables but is seldom used. This spring also supplies the house with water.

Besides the barn are the other necessary outbuildings, including a roomy driving shed and implement house.

From the description of the barn it will be readily understood that Mr. Brodie makes stock management a leading feature. At the time of our visit his herd of short horns were in splendid shape, the herd is composed of twelve head, viz:—Stock bull, yearling bull, six cows and four calves. They are good representatives of the breed, have excellent pedigrees, and are descended from bulls imported by the Hon. John Dryden. This herd has been very successful in the show ring at the local fairs.

About four milch cows are usually kept in summer and two milked in winter

For the size of the farm a great deal is done in the way of fattening stock. There are generally on hand, but especially in winter, a number of two or three year old store cattle. They are bought up late in the fall or early winter. There are generally about thirty fattened each winter, it is found to pay much better than raising the calves on the farm.

Like many of the stock men in the townships at the back of Toronto, Mr. Brodie has a fondness for good horses, and has done something in importing as well as breeding them. The imported Clydes include a stallion and two imported mares, one filly and two colts. Besides these there are three Canadian Clydes.

In horses as well as cattle the proprietor of Craigirburn is a successful exhibitor both at the local shows and larger exhibitions.

Not very much is done in keeping sheep and pigs.

It may be added that as a rule no store cattle are kept during the summer months.

The thoroughbred calves are allowed to suck their dams until five or six months old, being allowed to the cows twice a day.

The grade calves are allowed to suck until about four weeks old when they are sold to the butcher. During the hot weather and when the flies are troublesome the cattle are stabled during the day and turned out at night.

When the pasture begins to get dry and scarce, it is supplemented with soiling crops. Green corn is fed three times a day in the stables, and cows giving milk get in addition a little chopped grain. This is continued until the weather is cold and uncomfortable in the fall, when they are stabled the most of the time, being only allowed to run in the barnyard in the afternoons when the weather is favourable, when stormy or very cold they are allowed out only long enough to get water and admit of the stables being cleaned out.

The winter rations for store cattle, milch cows and thoroughbreds are somewhat the same, differing only in the proportion and quantity of the food comprising the ration. The ration is composed of chopped peas, barley and oats (the proportion of each being regulated by the prices) clover, hay and straw cut and roots. Bran often supplements the chopped grain when cheap enough. The store cattle get about 10 to 12 lbs. of the meal, 30 to 40 lbs. of roots and all the clover hay and straw that they will eat. The cows giving milk get about the same qnantity. The others do not get so much meal or so many roots.

The calves which are suckling, as soon as they will eat it, get a ration of clover hay, roots and chopped grain mixed with a little oil cake.

Of this ration they get all that they will take, the object aimed at being to keep them steadily and rapidly growing.

The rotation is one of seven years, as follows, roots, barley or wheat seeded down, cut for hay twice, pasture once, peas followed by oats.

The farm is divided into 12 acre fields with the exception of one of five acres, so that the acreage of crops is 24 acres of hay and 12 acres each of roots, pasture and the different grains.

Manure is applied at the rate of about 15 tons an acre in the fall for the root crop. A good deal of work is put on the land after harvest in way of ploughing, harrowing and cultivating, and then ridged up into 14 feet lands. When dry and as early as possible the next spring the ground is again thoroughly tilled.

For roots the drills are made about 27 inches apart. For corn the spring cultivation is very shallow, the rows being made three feet apart and the seeds not closer than one seed every six inches. The corn is harrowed once a week until about six inches high, then the scuffler is freely used. Mr. Brodie puts a great deal of work on his corn and root crop in horse and hand hoeing, and in fact so does every good farmer.

For grain crops the land is surface worked in the spring. The barley and wheat are sown at the rate of 1¾ and 1½ bushels per acre, and grass seed, half timothy and half clover by measure at the rate of twelve lbs. per acre.

For peas the sod is not ploughed until spring. Seed is sown at the rate of two bushels per acre. After the peas are harvested the ground is well cultivated. Surface cultivation in the spring and sown with oats 1¾ to two bushels an acre.

It may be taken for granted that on this well managed farm the manure will be well attended to. All the straw passes through the stables. The solid and liquid manures are together wheeled out and the cattle, horse, sheep and pig manure well intermixed.

The cattle are allowed to tread it solid, thus preventing exposure to the air. We were told that an average of about 300 loads of first class manure is made every year. In early spring about 100 loads are taken away from the building so as to keep the yard and surroundings neat and clean about the doors. This is applied to the land needing it, the 180 loads being allowed to remain until after harvest for manuring the field ready for the roots.

Having at our second inspection of this farm, on the 15th of September, again gone thoroughly over it with the view of more carefully reporting than the notes of our first visit enabled us to do, we were kindly invited to remain over night and then we found out that Mrs. Brodie in her department was quite as good a manager as Mr. Brodie was in his. A very pleasant evening we spent in that comfortable farm house. We there fully realised that they and their family were doing their share towards placing agriculture on a higher level and giving to farmers a better status. Mr. Brodie is not one of those men who thinks he knows all that is to be learnt about farming, or who sneers at those who believe that the light of science is doing much to develop the hidden mysteries of our profession.

Two of his sons have been amongst the brightest students at our Agricultural College. One of them taking the highest honors being the gold medalist of 1889.

Men like Mr. Brodie do much to ennoble our calling. they show that science and practice reflect light on each other, the more to be desired is this for there is no pursuit in which habit is so inveterate or unyielding as amongst those who cultivate the soil.

On Monday, the 28th of July, we again met in Toronto and left by the Montreal steamer at 2 p. m. for Bowmanville ; as Darlington is the port at which the boat leaves passengers for Bowmanville, we found that we had between two and three miles to walk no conveyance of any sort being at the wharf. We there and then made up our minds that the next time we had to go to that town we would take the G. T. R.

Next morning was bright and clear when we started on our drive to the farm of Mr. Pascoe. Leaving Bowmanville we took the Scugog road passing through the trim neat little village of Hampton, thence by way of Solina and passing it about a mile came to the first farm on our list to be inspected.

MR. PASCOE'S FARM, TOWNSHIP OF DARLINGTON.

Silver Medal.

This farm is pleasantly situated with a gentle slope to the north ; the portion entered comprises 100 acres. The soil is a clay loam with a porous subsoil. The natural drainage is good for as well as possesing a porous subsoil the farm lies in a way that no water comes on it from any adjoining land and it has sufficient fall for the surface water to run freely off. The land is more than usually free from thistles and weeds, this can be readily accounted for by the system of tillage followed. It is largely the result of plenty of fall working. Immediately after harvest the ploughs are set to work and even during harvest if there is any time to spare. Some of the fields being plowed as much as three times when there is time to do it and when it is thought the land will benefit by it. Manure is drawn on to the fields in the fall after the first thin ploughing and is covered with a light farrow and late in the season ridged up. This appears to be an excellent plan, for not only is the land being freed from weeds but in this way an opportunity is given for any foul seeds which may be in the manure to germinate and thus many of them be got rid of instead of being deeply buried come into life again the following season when brought into favourable conditions for germination.

The ordinary system of cropping on this 100 acres is to grow about 30 acres of barley and 20 acres of spring wheat and about 8 acres of roots. The peas and oats are grown on sod ploughed up, then followed by wheat or barley part of which is seeded down and the balance comes in for oats and roots the following season. We saw on this farm five acres of English barley, it was late but looked well, usually cut about 20 acres for hay. The large quantity of grain and hay is accounted for by the other farm which is somewhat broken and well supplied with water being mainly used for pasture.

The root crop, including potatoes, mangels and carrots exceptionally good and had been well attended to. Spring wheat like all the rest we had seen in the neighbourhood a complete failure.

The manure management was a noticeable feature, it was cleanly gathered up from all parts of the yards, mixed in one large heap so as to prevent as far as possible all waste.

The buildings form three sides of a square. The main barn is 95 by 34 with stone basement, in which is well fitted up stables conveniently arranged. The other buildings are all good of their sort, they include sheep houses, driving shed, implement house, etc., with all the surroundings neat and trimly kept. The dwelling house is a nice stone building with verendah on three sides. The garden exceptionally good and well attended to, it was well stocked with a plentiful supply of the various sorts of small fruits and vegetables. The orchard in excellent shape, with cherry, plum, pear and apple trees in full bearing.

From seven to eight cattle are fattened annually, and about the same number of cows kept, the milk being sent to the cheese factory. A small flock of sheep is kept and a few pigs fattened.

This is a well managed farm, not noticeably strong in any one line, but showing good farming all round.

MR. BAKER'S FARM, TOWNSHIP OF DARLINGTON.

This farm is just across the road from the last one seen, and like Mr. Pascoe's is pleasantly situated ; from the high ground a magnificent view can be had of the surrounding country for many miles. Looking across the township of Darlington the hills can be seen away off in the township of Clarke and from the highest parts of these two farms can plainly be seen the villages of Tyrone, Enniskillen and Hampton, as well as having a fine view of the lake ; often on a fine day ten or twelve boats can be seen at one time.

When ready to look over Mr. Baker's farm we were unfortunate in not being able to find either that gentleman or any one else who could give us the information required, and it was only when we were ready and had to leave so as to get through with the rest of our work so as to be in time to catch the train, that we had an opportunity of having a few minutes talk with him.

The farm is bounded on two sides by the public road, being 200 rods on one road by 80 on the other, comprising 100 acres, of which 15 acres on the southwest corner is bush. The soil appears to be a strong clay loam and shows signs of being very well cultivated. The growing crops were strong, even and good, excepting spring wheat which as before said is a failure in all this section.

The want of a private road caused the field arrangement not to be so convenient as desirable. Fences uniformly good, including post and board on front road and wire on side road.

The homestead was chiefly made up of an exceptionally fine bank barn, 100 by 50, with end drive. Dwelling house not amounting to much. It may be mentioned that Mr. Baker does not live on this farm but on one adjoining.

A great deal of attention is paid to stock amongst which are four short horns and twenty registered Shropshires.

The horses are away up above the average; considerable is done in handling this class stock, often from fifteen to twenty being bought and sold in a year. Store cattle are bought for fattening in preference to raising them, ten to fifteen fattened annually.

Mr. Baker appears to be a pushing, energetic man and a good farmer.

MR SAMUEL ALLAN'S FARM, TOWNSHIP OF DARLINGTON.

Ward-dale is the name of this farm, it is situated two and a half miles east of Bowmanville and what seemed to us a good long way from the last one we had been at. It comprises 155 acres besides which there is 20 acres in pastures near by, the soil is a heavy clay loam. About 800 rods of underdrains have been put in and much more of this work is intended to be done. Mr. Allan thinks there is no way in which he can obtain higher dividends for his money than in using it in draining the wet parts of his farm. It would be well for the country and for the individuals themselves if more of our farmers looked at it in the same way.

This property is bounded on three sides by the public road. The road fences are all straight, partly wire with pole on top, a portion picket, and the balance post and board. Inside fences mostly rail.

Running through this farm from the rear or north east side and crossing the public road at the front and near the dwelling house is a ravine with finely wooded banks and with a stream of spring water flowing at all seasons of the year. Besides this wooded ravine there is a great deal of fine second growth timber dotted about different parts of the farm, giving it a very pleasant landscape view. When we consider the abundant water supply and the fine shade for the stock we think that on the whole the property is more valuable although somewhat broken in this way.

The acreage of crops this year is forty acres of barley, wheat seven acres, fifteen acres of oats, seventeen acres of peas, thirty-four acres of hay, pasture thirty acres, nine acres carrots, mangels, turnips and potatoes and small quantity of corn, orchard, garden and yards three acres.

The system of applying manure is to draw out and plough in in the fall for roots, the balance is drawn in the winter and spread upon the fields intended to be sown with barley or wheat the following spring. Mr. Allan has practiced this system on his farm for many years and finds that it answers exceedingly well as compared with other ways of applying it, however, it must be remembered that this is a comparatively level farm and very little loss is sustained by washing.

Mr. Allan stands high in stock, the herd of Short-horns numbering fourteen includes a number of animals of great individual merit. They are partly bred from cattle originally owned by John Miller and some of them trace back to what are known as the Wade importations; the animals in this herd now have a large percentage of Crookshanks blood.

For three years in succession the herd prize at the county of Durham show has come to this farm as well as a great many individual prizes, including sweepstakes prize for two year old bull.

The flock of sheep is made of thirty Shropshires which looked well at the time we saw them.

The buildings are hardly up to modern ideas of first class homesteads. Mr. Allan is a pushing, money making farmer, besides the farm he lives on he owns a great deal more land.

Bidding Mr. Allan good bye we drove to Bowmanville, boarded our train, reached Toronto late at night and next day were busy on our own farms.

JOHN I. HOBSON, } Judges.
WM. DONALDSON, }

MINUTES OF MEETING OF COMMITTEE FROM THE AGRICULTURE AND ARTS ASSOCIATION AND THE FAT STOCK CLUB OF GUELPH.

CITY HALL, GUELPH, October 1st, 1890.

Present—J. C. Snell and Henry Wade from the Agriculture and Arts Association, and Walter West (in the chair), Wm. McCrae, James Taylor, Thos. Waters, James Miller, John Tyson, James Anderson, Wm. Sharpe, R. Buchanan, Geo. Taylor, H. Wright, R. Elliot and J. W. Easton, from the Fat Stock Club.

Mr. Wade explained to the meeting that the Agriculture and Arts Association had voted $300.00 towards holding a fat stock show in conjunction with the Fat Stock Club of Guelph, consequently the meeting had been called in order that a partnership arrangement might be consummated.

The election of officers for the joint board was then proceeded with.

Moved by Wm. Walker, seconded by James Miller, That J. C. Snell, of Edmonton, be appointed president.—Carried.

Moved by Geo. Taylor, seconded by Wm. McCrae, That Walter West, of Guelph, be vice-president.—Carried.

Moved by Jas. Miller, seconded by John Tyson, That J. W. Easton, of Guelph, be appointed treasurer.—Carried.

Moved by Jas. Anderson, seconded by Jas. Taylor, That Henry Wade, of Toronto, be secretary.—Carried.

Moved by Jas. Anderson, seconded by Jas. Miller, That H. Wright, of Guelph, be general superintendent.—Carried.

A communication was received from Wm. Weld, of the *Farmers' Advocate*, offering a cup of the value of $40.00 for one of the prizes.—Accepted.

Also a communication from C. Reinhart, offering $15.00 as a special prize, which was accepted.

The McAteer cup, value $60.00, would also be available; won last year by Thos. Ballantyne, of Stratford.

Mr. J. C. Snell then took the chair and thanked the meeting for the compliment they paid him in electing him.

A telegram of apology was read from N. Awrey, M. P. P., of Binbrook, deploring that other engagements would prevent him attending.

A letter was also read from C. M. Simmons, of Ivan, regretting his inability to attend as he had other engagements for the day, and also recommending rules of procedure for the show.

The prize list of a former show was then revised and rules and regulations adopted as they appear in prize list for 1890.

Moved by Thos. Waters, seconded by Jas. Miller, That the Agriculture and Arts Association agree to hold a fat stock show in the City of Guelph, in December next, in connection with the local Fat Stock Club, the former association to pay $300.00 and the Fat Stock Club to pay $200.00 towards the prize list, on the understanding that the Fat Stock Club and the City of Guelph shall furnish the necessary accommodation for the holding of the show, and make up any shortage that may arise in connection with holding such show, over and above the amount realized and gate fees. The $500.00 to be offered in prizes.—Carried.

The meeting then adjourned.

After the prize list had been printed and circulated a letter was received from the secretary of the Hereford Breeders' Association, of Independence, Mo., informing the association that the sum of $50.00 had been voted by that association some time ago, to be given for Hereford grades at this show. As I had not received the letter, it was, of course, not printed in the prize list. I also heard that the Guelph management would like a further prize for fat lambs in addition to the present prize list, so I took on myself the responsibility of issuing an additional prize list in sheet form for posters, adding these prizes.

On the 12th of November there was received at my office a notice of a committee meeting of the joint committee to take place on Saturday, the 15th inst., but as I had left home on Monday evening, the 10th of November, the notice was not acted on, and none of the committee from the Agriculture and Arts Association were present.

On the 18th November, I received from J. W. Easton, the following list of judges that had been appointed at that meeting:—

Cattle.—Jos. Dingle, Hamilton, John Hope, Brantford, John Dunn and Ald. G. F. Frankland, Toronto.

Seeep.—Henry Arkell, Arkell, W. G. Gow, Fergus, Wm. Thompson, Elora.

Hogs.—John A. McHardy, Guelph, J. Alison, Galt, Jas. Laidlaw, jr., Guelph.

Poultry.—Jas. Goldie, Guelph, Geo. Tolton, Guelph, Geo. Murton, Guelph.

And the following:—As the curling rink is not available it was decided to hold the show in the Western Hotel stables and yard.

On Saturday, the 24th of November, I went up to Guelph to see how matters were progressing, I met a few of the directors and the vice-president Walter West, at the city hall, when matters were talked over, and Richard Gibson, of Delaware, was appointed a judge on cattle in place of John Hope, who was to be an exhibitor.

H. WADE,
Secretary.

At this meeting the following committees were appointed :

On Cattle.—Jas. Miller, L. O. Barber, Prof. Shaw and C. M. Simmons.

On Sheep.—Geo. Taylor, J. M. Tyson, W. Laing and N. Awrey, M. P. P.

On Hogs.—Alf. Hales, R. Irving and Thos. Waters.

On Gates.—E. Parkinson, W. Laidlaw and J. C. Snell.

Weighing Master.—Walter Laing.

For pens of lambs $1.00 was to be the entrance fee. Badges to be got by the Guelph committee, and tickets and prize ribbons by the secretary.

HENRY WADE,
Secretary.

MEETING OF COUNCIL OF AGRICULTURE AND ARTS ASSOCIATION.

ROYAL HOTEL, Dec. 10th, 1890.

The council were all present with the exception of J. C. Rykert.

Minutes of former meeting were read and confirmed.

The following letters were then read :—

TORONTO, Dec. 8th, 1890.

DEAR SIR,—Under authority of the Agriculture and Arts Act, I appoint Joseph Bigelow, of Port Perry, auditor of the accounts of your association for the present year.

Yours very truly,

JOHN DRYDEN,
Minister of Agriculture.

HENRY WADE, Esq.,
Secretary, Agriculture and Arts Association,

Moved by C. M. Simmons, seconded by J. C. Snell, That Mr. John I. Hobson, of Mosborough, be second auditor.—Carried.

Moved by Jas. Rowand, M. P., seconded by N. Awrey, M. P, P., That as the work of auditing would not be nearly as arduous as on former years, that the emolument be reduced to fifteen dollars each.—Carried.

INDEPENDENCE, MO., Nov. 29th, 1890.

HENRY WADE,
Secretary, Toronto, Can,

DEAR SIR,—Yours of the 21st inst., received and duly noted. By same mail as this I send you all the volumes (10) of the American Herefort Record, which please accept with the compliments of our association. I also send you a copy of our by-laws, rules, etc., and a sample of the blanks used for reporting calves for entry and transfer.

I remain,
Yours respectfully,

C. R. THOMAS,
Secretary.

Moved by N. Awrey, M. P. P., seconded by Joshua Legge, That a cordial vote of thanks be tendered to the American Hereford Association, through their secretary, C. R. Thomas, Esq., for the very handsome gift of the ten published volumes of the American Hereford Herd Book, together with constitution rules and regulations.—Carried.

MR. HENRY WADE, SEC'Y.
Toronto, Ont.

DEAR SIR :—The American Hereford Cattle Breeders' Association wishes to offer the following special prizes at your *Fat Stock Show* (Ontario Agriculture and Arts Association) this year and trust same will be accepted by you and receive space in your premium list.

Best *Grade* Hereford Steer, 2 and under 3 years.

1st premium	$12 00
2nd premium	8 00
3rd premium	5 00

Best *Grade* Hereford Steer, 1 and under 2 years.

1st premium	$12 00
2nd premium	8 00
3rd premium	5 00

Animals to be eligible to compete for the above must be sired by a bull recorded in the American Hereford Record. When your premium list is ready please send one to each breeder in your vicinity and oblige.

Yours respectfully,

C. R. THOMAS,
Secretary.

N. B.—I am sorry to inform this council that not one entry has been made for these prizes this year.—H. WADE, Secretary.

A letter was read to the secretary from A. C. Hallman *re* terms for starting a Holstein Herd Book in Canada.

A discussion then took place by several of the members on the advisability of continuing the medals for farms, Mr. Awrey taking the ground that under the present rules and regulations, the scheme did very little good. Messrs. Rowand, Snell, Sissons, Morgan, and McPherson were in favor of the scheme, but were quite willing to amend the rules, if deficient.

Mr. Legge also spoke in favor of adding an amount to the estimates to grant a silver and bronze medal to offer as a Provincial prize at each of the Electoral Division Societies.

Moved by C. M. Simmons, seconded by D. M. McPherson, that a committee consisting of the President, Messrs. Awrey, Snell, McPherson, Legge and the Secretary be appointed to amend the rules in connection with the prize farms. Carried.

Meeting then adjourned until next morning at 9 a. m.

H. WADE,
Secretary.

A dinner was given at the Western Hotel, where the Fat Stock Show was being held, to the Council of Agriculture, the Judges and other prominent gentlemen by the Directors of the Fat Stock Club of Guelph. The tables and rooms were nicely decorated by Mr. and Mrs. McAteer, proprietors of the hotel. Mr. J. C. Snell as president of the joint board presided. W. Walter West as vice-president took the vice chair, and Wm. Sharp as second vice-president, the third place of honor.

Before leaving the dining room, Mr. Snell on behalf of himself and all present, thanked the Guelph Fat Stock Club for their kindness in providing such an excellent repast. From the hurried glance he had of the show it was equal to his expectations, and he only wished that the city of Guelph, or some other city, would take the matter in hand of erecting suitable buildings and establishing a permanent Fat Stock Show. The city of Guelph should take time by the forelock, erect buildings and make Guelph the permanent Smithfield of Canada. If they did not take this matter in hand the probabilities were that they would get left. He then called on Mayor Gowdy.

The Mayor said that he saw to-day a show of fat animals second to none ever exhibited in the Province, and on behalf of the city welcomed the A and A Association. In the present financial state of the city he was afraid that it alone could do nothing towards the erection of suitable buildings for fat stock show purposes, unless some aid was given by the Ontario Government. Guelph was the headquarters in Ontario for cattle, and as a horse fancier he would like to see it made the headquarters for horses also, and he thought that the time was near at hand.

The chairman regretted that the Minister of Agriculture was not present He paid him a high compliment for his ability and capabilities for filling the office. He then called on

Mr. D. Guthrie, Q.C., M.P.P., who made one of his usual happy and interesting speeches on such occasions. He was happy to say that the Government did everything they could to promote the agricultural interests of the Province and he, as a member of the Legislature, did everything he could to second them in these efforts. In the last Legislature the farming interest was well represented by intelligent and progressive men, and it will be equally well represented in the one soon to meet. The live stock interest was expanding and it had become the back bone of our prosperity, and he hoped it would be developed more and more until the whole Province would become the home of the best breeds of cattle.

Mr. Thos. Ballantyne, M.P.P., said that the Legislature was always alive to the interests of the Province in agricultural matters, and had always done everything that could reasonably be expected of them to do, and he had no doubt so long as Mr. Mowat was in power it would continue to do the same.

Mr. N. Awrey, M.P.P., Binbrook, said that the calling of the farmer was becoming more important year by year, and was considered more respectable, they not now being looked down upon as the "hewers of wood and drawers of water." The agricultural interest was the most important in Canada, and without it all other industries would be a failure. He regretted that the great city of Toronto did not recognize this fact, for they never thought it fit to provide a place where fat stock shows could be held. If Guelph provided a creditable place to hold these shows, they would come to Guelph. He hoped this city would show its enterprise and push in securing the show permanently; if not Hamilton would put in a bid for it. The animals exhibited were equal if not superior to those he had seen exhibited in Chicago.

Ald. Frankland, of Toronto, said it would be one of the greatest mistakes ever made if an attempt was made to establish a Provincial Fat Stock show in Guelph

Toronto was the proper place, being the metropolis of the Province. He advocated young animals being exhibited for one time at shows and then killed and not held over till they became tallow. He had watched the development of the live stock industry in Ontario and Quebec, and he found that Ontario had now keen competition, as Quebec supplied a large number of fat cattle to the city of Montreal. The best cattle ever he saw exported were from the township of Pickering, so Guelph was not the only place noted for this industry. This meeting then adjourned until after the judging of the live stock in the drill shed, when it was presided over by Mr. Snell, while Mr. H. Wade acted as secretary.

The first matter attended to was the reading of the annual address of the President of the Agriculture and Arts Association, Albin Rawlings Esq., of Forest.

GENTLEMEN :—The few words I shall have to say to you to-day will I hope only occupy a few minutes. For the past year we have been, as the saying is, "Laying on our oars." It is true we have had several ploughing matches, but there seems not to be now so much interest taken in them as in former years, at least that is the case in my district. We have also given a number of prizes for the best farms in several districts, but there is not the rivalry there should be to my mind.

I will tell you in a few words what I think is the best course for this Association to pursue in the future. I would advocate a rousing spring show, two weeks say before Easter. An agricultural show pure and simple, where farmers and breeders could meet together and where seed, animals and fat ones could change hands by the hundreds. It is a well known fact now, if a person wants a good animal he has to spend days in search of it, whereas if he had a large show in some central place in this Province, people could get what they wanted without so much expense and waste of time. Another well known fact is, that many of our farmers sow the same kind of grain until they do not get half a crop.

Now, gentlemen, my plan would be to have a show of seeds and animals, so that our farmers could buy in large quantities, so these investments would pay from fifty to one hundred per cent. in many cases. If a show of this kind would ever get to have as many rivals as the old Provincial Show did, it would be a great blessing to this Province ; as we must all admit, the Provincial was the mother of the large shows we have to-day. Gentlemen, I cannot close these few remarks without noticing the deplorable fact that our store cattle have been shipped out of this country by the thousands, to the loss of our farmers by hundreds of thousands of dollars. Our store cattle go to Europe and our oil cake goes there to fatten them, when it should be fed to them here and the good manure kept on our farms. We all know if a farmer sells his store cattle, grain and hay, and puts nothing on in return, the farm gets poor and the farmer also, and the next thing is a mortgage, which finishes up in ruin. Now, gentlemen, if there is anything we can do to stop this downward road, it is our duty to do it. Another matter calls for a few remarks, of a more cheering nature however, that is our veterinary college in the city of Toronto. Too much honor cannot be bestowed on Professor Smith for the flourishing condition of that institution. Your Association signed no less than 140 diplomas for the honor graduates of that college this year. Such an institution is an honour to any country.

Now, gentlemen, one word about the fat stock show. I think much honor is due to the members of the Fat Stock Club, of the city of Guelph, for the energy displayed in getting up this show and keeping it up. I am sure the small grant given by the Agriculture and Arts Associations has been well spent to this country. I thank you gentlemen for the honor you have done me in placing me in as its chief officer for the past year.

Mr. Snell also commended the work of the Club as they had one of the most difficult shows to keep going. It was right that there should be a show where could be seen animals fed to their highest development for the butcher's block, to to which the main portion of their stock went, as there was a show where their breeding was the chief factor. To feed an animal was to destroy its breeding qualities. It was unprofitable to feed animals three years and over. Next year in Chicago no prizes would be given for animals over 2½ years and the same thing was contemplated in Great Britain.

Prof. Shaw, O. A. C., on behalf of the Club, expressed their pleasure at having the Council of the A. and A. Association; they hoped they would come annually, and they would do all in their power to provide a suitable building. Prof. Shaw then spoke of the magnitude of the live stock interest, and the necessity of the farmer, if he wished to prosper, to quit the raising of grain to sell. At the Experimental Farm they had a fair return this year. On a little over 400 acres they had received between $6,000 and $7,000 for their output. Though not safe at present in being definite, he hoped to have a balance on the right side. He regretted that they had not a better place for the show; an industry which brought thirty millions of hard cash into the country every year should have more encouragement. He referred to the steps that had been taken to get an agricultural building in Toronto, and said that if that city were not willing the city of Guelph and the farmers here were able and willing to erect one. They could expect a grant from the city council and the citizens of Guelph were not indifferent to the name and standing which the live stock interest had given their city. Nor were the farmers indifferent to the higher prices that had been brought about by these shows. If the City Council took it up, the township councils aiding them, with the backing of the citizens and farmers, a commodious and comfortable building could be erected with a little effort. He was greatly pleased with the show, with the interest taken in it and with the judging. Their students only differed in two awards, and there they judged as they had been taught. They were thus preparing cattle judges, as well breeders and feeders to take the prizes.

Mr. West spoke of the grant of a site by the City Council, and called upon the A. and A. Association to aid them in erecting a building according to promise.

Mr. Innes, on behalf of Mr. McAteer, presented the McAteer cup to Mr. W. W. Ballantyne. He expressed his gratification at Mr. Ballantyne's success, and congratulated him on winning such a handsome trophy. He hoped it would prove an incentive to him and to others, and that it would be but the beginning of his success.

Mr. Ballantyne, in returning thanks, said he had won it fairly, and would prize it highly.

Mr. Frank Shore, London, or behalf of the *Farmers' Advocate*, with which he is connected, presented the beautiful silver tea service offered by that journal, to Mr. Jas. Oke. He expressed his pleasure at giving it to one who had brought out so many good animals. These shows were not only incentives to the breeders, but were great educators. He referred also to the standing of Canadian feeders in the States.

Mr. Oke acknowledged the gift in a few suitable words.

Ald. Frankland, after a humorous introduction, spoke at some length. He believed young Ballantyne would do well, because of having such a father, and gave credit here to the men who had laid the foundations of the live stock industry, and to the men then and now who lived not for themselves, but for the present age and the future. He referred to the strides Canada has made. The Americans grow corn; we can grow peas, if the land was properly cared for

Farmers should give back to the land what they took out. He could have made more profit by shipping store cattle than by shipping fat cattle, but his gain would have been Canada's loss, and he would not do it. He was against ranches; they entailed awful suffering on the weakly part of the herds; he favored 100 and 200 acre farms, where the owner knew every one of his beasts by sight. He hoped that in the years to come in Canada there would be millions of people from Great Britain and Ireland not servants, but freemen. He praised Mr. McAteer's big heartedness in his hospitality and in his handsome cup. The animal they wanted for export was from 1,400 back to 1,200 lbs., two to three years old, which would dress the carcase wanted in England. The farmers owed a great deal to the army of exporters, which had built up the trade. It was a speculative business; though he had handled hundreds of thousands of dollars, on three distinct occasions he had been unable to pay for a hundred of cattle. This year on his first four cargoes he had lost over $5,000. He could not understand why $5 a hundred would not pay the farmer. He also alluded to the immense importance of Canada's clean bill of health, which gave them such an advantage over other countries, and urged that it be carefully guarded. He advocated mixed farming, lots of manure, taking good care of the calf flesh. He referred to the want of a proper building, and made suggestions as to its erection. They had as fine stock in Canada as in any country in the world; they had as fine a country. He urged them to be patriots, and referred unfavorably to the U. S. as never being a friendly trading people.

Mr. Ballantyne, M.P.P., the joint owner of the McAteer cup, gave the credit to his son and thanked Mr. McAteer for his interest in the live stock industry. His visits to Guelph 25 years ago had quickened in him the desire to breed and to feed good cattle Latterly he had gone into dairying, but had not forgotten the other. Live stock might suit some best, dairying others; feed in any case intelligently, thoroughly and generously. He also spoke out strongly against the export of store cattle; it was allowing the most profitable part of the cattle raising to go into other hands. Corn could be fed with great advantage some years, and the Central Farmers Institute were right in unanimously urging the Government to remove the duty. He also referred in most cordial terms to what the county of Wellington had done for the Province in developing the live stock industry: in years past more attention had been paid to live stock here than in all the rest of Canada put together. Now other counties had followed its example, but it was still the headquarters, still the banner county. It was only in Guelph where the live stock industry was so valued that a citizen could be found to present such a splendid prize as the McAteer Cup.

Mr. Awrey, M.P.P., urged farmers who clung to grain raising for their living to strike out in new lines. Live stock and dairying gave a profit; grain-raising to sell did not. He showed the high standing of Canadian cheese in England, due to the efforts of Ballantyne in the west and McPherson in the east, to whom the Province owed more than to almost any two men, and argued that there was nothing to prevent the butter industry from attaining the same rank, instead of it being a byword, as was the case in England at present. Proper and united management would give them $10,000,000 of choice butter for export. He referred also to the immense loss to the farmers on account of agricultural implements being left exposed to the weather. One of the most successful farmers he knew raised 60 head of cattle on 100 acres, and bought hay and grain from his foolish neighbor who sold store cattle. He congratulated the Association and the Club on the successful, interesting and profitable show.

Mr. Hobson moved a vote of thanks to the chairman and the joint board, under whose direction the Show was carried out. He also referred to W. W.

Ballantyne being a student of the O. A. College, and the work it was doing for young farmers.

Mr. Arthur Johnston seconded it, and the motion was carried unanimously.

Mr. Snell, in acknowledging spoke of their kind reception. He was proud of the show, and proud of the meeting. It had never been surpassed.

Mr. Rowand, M. P., moved a vote of thanks to Mr. McAteer for his inside and outside accommodation. This was supported by Mr. Awrey and Mr. Simmons. Very few men, they said, would have gone to so much trouble.

Mr. McAteer expressed his pleasure at having them there, and spoke of his willingness to do his share at any time.

Messrs. Anderson and West moved a vote of thanks to Mrs. McAteer and her lady help, which was carried in proper style.

The meeting broke up at 11.20 p. m. All the speakers were most deservedly applauded, and though many had to stand, the interest did not slacken in any degree from start to finish,

THE O. A. C. STUDENTS.

The show has furnished a good object lesson for the students at the O. A. C. and it has been taken advantage of to the full extent by Prof. Shaw, Mr. Storey, and the live stock classes who last night and this morning made a close inspection and had a course of instruction on the animals, Messrs. Carlyle, Thompson, and McKenzie, were chosen by the students to judge the cattle, and in all save two instances they agreed with the judges, and in these two, as Prof. Shaw intimated. their judgment agreed with his own, the finer points of some of the animals not weighing so much in the eye of the judges as their value.

ROYAL HOTEL, GUELPH, Thursday, 11th December, 1890, 9 a.m.

All the members present that were in attendance yesterday.

Mr. Awrey then presented the report of the requirements for 1891.

To the President and Directors of the Agriculture and Arts Association :

Your Finance Committee, after careful consideration, and with a view of keeping the expenditure within the narrowest limits consistent with efficiency, beg leave to report that they will require for the different services of the year.

Spring and Fat Stock Shows	$1,000 00
Ploughing Matches	600 00
Expenses of Board	500 00
Printing	800 00
Postage, Express, etc	300 00
Salaries	300 00
Gathering and printing information *re* International Exhibition, Chicago	250 00
Prize Farms	250 00
Medals for Electoral Division Association	350 00
	$4,350 00
Your Committee would further recommend that a sum not to exceed $1,000.00 be granted to the Short Horn Association for printing old pedigrees	1,000 00
	$5,350 00

All of which is respectfully submitted.

N. AWREY,
Chairman.

This was carried.

Prize Farm special committee reported as follows:—

Rules for guiding Judges of Prize Farms previously used.

"In addition to any other points that may be thought desirable by the Judges, the following shall be taken into consideration in estimating what is "the best managed farm."

(1) The competing farm to be not less than one hundred acres, two-thirds of which must be under cultivation.

(2) The nature of the farming, whether mixed, dairy or any other mode, to be the most suitable under conditions affected by local circumstances.

(3) The proper position of the buildings in relation to the whole farm.

(4) The attention paid to the preservation of timber and shelter by planting of trees.

(5) The condition of any private roads.

(6) The character, sufficiency and condition of fences, and the manner in which the farm is subdivided into fields.

(7) Improvements by removal of obstacles to cultivation, including drainage.

(8) General condition of buildings, including dwelling house, and their adaptability to the wants of the farm and family.

(9) The management, character, suitability, condition and number of live stock kept.

(10) The number, condition and suitability of implements and machinery.

(11) State of the garden and orchard.

(12) Management of farm yard manure.

(13) The cultivation of crops to embrace manuring, clearing, produce per acre in relation to management and character of soil and climate.

(14) General order, economy and water supply.

(15) Cost of production and relative profits.

The examination by the Judges to be not earlier than 25th May, and to be finished in September.

The two Judges shall decide the Township and Electoral Division prizes by themselves, taking notes of the farm or farms for the gold medal for the Group.

The report of the Judges to be submitted to the Board and forwarded to the Commissioner of Agriculture."

To the President and Members of the Board of Agriculture and Arts:

Gentlemen.—Your Committee appointed to revise instructions to Judges of farms entered for competition, beg leave to report as follows:

Rule 1.—Same as in report of 1888.

Rules 2 and 3.—Struck out.

Rules 4 and 5.—Same as in 1888.

Rule 6.—Amended by inserting the following in lieu thereof. The sufficiency and condition of fences suitable for the requirements of the farm.

Rule 7.—Same as 1888.

Rules 8 and 9.—Struck out.

Rule 10.—Amended by striking out the word number.

Rule 11.—Same as 1888.

Rule 12.—Same as 1888.

Rule 13 to be as follows: The manure and application to the cultivation of the soil for the growing of crops, as well as methods adopted for increasing the quantity and quality.

Rule 14.—Amended by inserting in lieu of the former clause the following: Economy of water supply.

Rule 15.—Struck out and the following inserted in lieu thereof; In arriving at a decision the Judges must consider as the essence of merit the relation of profits in proportion to cost of production with due regard to maintaining the fertility of the soil.

All of which is respectfully submitted.

N. AWREY,
Chairman
J. LEGGE.
J. C. SNELL.
D. W. MCPHERSON.

This Committee would also further recommend that this association give to each Electoral District Agricultural Society in this Province, one silver and one bronze medal, to be competed for upon such conditions and regulations as may be adopted by each Electoral District Board of Directors, and they would suggest that the only condition attached by this council be that the medals given by them be competed for by animals owned within the boundaries of the respective Electoral District.

On motion of N. Awrey, seconded by D. W. McPherson, the above resolutions were carried.

Moved by Ira Morgan, seconded by J. C. Snell, Whereas the World's and Columbia Exhibition will be held in Chicago, in the year 1893, and as the President of the United States will shortly issue a proclamation, inviting foreign nations to furnish exhibits;

Be it therefore resolved, that the council of the Agriculture and Arts Association of the Province of Ontario, call the attention of the Provincial Government and Legislature, to the necessity of measures being taken at once to secure the active co-operation of all classes of industries, in making an exhibit worthy of the resources of this Province, and to express the willingness of this board to aid in disseminating such information as would induce the stock raisers to exhibit their herds, so that an exhibit worthy of Ontario, which is the breeding ground for pure bred stock for the American continent, as well to call forth such an exhibition of the produce of the dairy, as will continue to place this great industry in the foremost place when brought into competition with the exhibits of the other countries of the world, and would further suggest to the Government, that they be authorized to arrange for the selection of the products of the forests, farms and mines, in the same systematic manner as was done for the Centennial prior to the year 1876, that we may be able to convince the people of the European nations of our great recourses, as well as of our rapid advancement in the direction of prosperity, that by so doing we may secure as perminent residents a large share of the desirable emigrants who are rapidly filling other portions of the continent. Carried.

Messrs Morgan, Snell, Simmons, Awrey and McPherson all spoke in favour of giving prominance to this undertaking and it was carried unanimously.

Mr. Legge.—I give notice that I will move at the next meeting, in 1891, that this association grant to the large central exhibitions held in Ontario, such as the City of Toronto, Ottawa, Kingston, Hamilton, London, Guelph and others, the large exhibitions a Provincial gold, silver and bronze medal, to be awarded on the samé principles as the electoral societies.

1. The Herd Book Committee beg leave to report recommending the acceptance of the tender of Mr. Daniel Rose for the printing of 250 copies of Vol. I., Ayrshire Herd Book, as his is the lowest tender.

2. The publication of vol 5 of the Clydesdale Stud Book.

3. The publication of vol. 1 of the new series of the Ayrshire Herd Book.

4. The publication of a volume of Berkshire Record, provided an association of breeders of Berkshire swine is organised, with a Herd Book Committee, which shall have power to revise and pass pedigrees found to be in accordance with the standard adopted by such association.

5. That the secretary be authorized to open a record for Dorset Horned Sheep.

6. And also a register for Holstein cattle, when the Association of breeders of these classes of stock agree to the usual terms on which the Agriculture and Arts Association undertakes such work.

7. That an Hereford Association in affiliation with the Hereford Record be encouraged. Carried.

J. C. Snell
Chairman.

PROVINCIAL PLOUGHING MATCHES.

A ploughing match under the auspices of the Agriculture and Arts Association of Ontario, and the County of Peterborough, for agricultural divisions Nos. 4 5 and 6, comprising the Counties of Hastings, Lennox, Addington, Prince Edward, Northumberland, Durham, Peterborough, Victoria, Haliburton, York, Ontario, Peel, Cardwell, and the City of Toronto, will be held on the estate of the late Jas. Howden, adjoining the Peterborough central fair grounds, on Wednesday, Oct. 29th, 1890, when the following prizes will be offered for competition:

Class 1 (open to all comers and ploughs).—1st prize, gold medal, value, $40.00; 2nd prize, cistern pump, presented by James Payton, Esq., value $6.00, and cash, $15.00, $21,00; 3rd prize, binder cover, presented by J. J. Turner, Esq., value $3.00, and cash, $12.00, $15.00; 4th prize, a clock, presented by Messrs. Clark & Gibson, value $2.50, and cash, $7.50, $10.00.

Class 2 (open only to walking ploughs without wheels, and ploughmen who have not taken a prize in any ploughing match since 1885).—1st prize. a pair of solid gold cuff buttons, presented by John McClelland, Esq., value $6.00, and cash, $24.00 $30.00; 2nd prize, a plough or root cutter, presented by P. Hamilton, Esq., value $15.00. and cash, $7.00, $22.00; 3rd prize, a silver sugar bowl, presented by W. A. Sanderson, Esq., value $4.00, and cash, $12.00, $16.00; 4th prize, a horse collar, presented by W. J. Devlin, Esq., value $3.00, and cash, $8.00, $11.00.

Class 3 (open only to boys under 18 years of age; proof of age to be given if called for)—1st prize, a silver medal, presented by R. W. Muncaster. Esq., value $5.00, and cash, $25.00, $30.00; 2nd, a plough or stove, presented by W. P. Plant, Esq., Norwood, value $5.00, and cash, $16.00, $21.00; 3rd prize. a creamer can. presented by W. G Bain, Esq., value $3.00, and cash, $13.00, $16.00; 4th prize, whip, presented by Messrs. Fortye & Phelan, value $2.00, and cash, $9.00, $11.00.

Class 4 (for stubble ploughing, open to boys only under 17 years of age; proof of age to be given when called for).—1st prize, a plough, by J. Fleury's Sons (T. Cochrane, Esq., Agent), value $15.00, and cash, $13.00, $28.00; 2nd, cash, $18.00; 3rd, cash, $12.00; 4th, cash, $8.00,

A suitable place will be provided, and an opportunity given, for a practical exhibition of sulky ploughs, and manufacturers are cordially invited to enter for the same.

RULES.

1. All ploughmen residing within the limits of agricultural divisions Nos. 4, 5 and 6, who are *bona fide* occupants, sons of occupants, or employees of occupants are eligible to compete in this match. All entries free.
2. Ploughmen will be required to plough at least six inches deep.
3. All competitors must be on the ground at nine o'clock a.m. sharp, and prepared to commence work when the signal is given.
4. Ploughmen will be required to complete the land allotted to them within a time not to exceed 14 hours to the acre.
5. No interference with, or assisting of the ploughmen, other than aiding them in setting their stakes, will be allowed.
6. Ploughmen will not be allowed to touch the furrows with their hands.
7. On finishing, the ploughmen will place their numbered stake in the centre of their land, and forthwith report to the Secretary.

It is particularly requested that all entries be made with the secretary on or before Saturday, 25th October, personally or by mail.

COMMITTEE.

Messrs. R. Vance, Ida; H. Humphries, Hastings; J. C. Snell, Edmonton; P. R. Palmer, Belleville; Wm. Rutherford, chairman of committee, Wm. Collins, secretary of committee.

PETERBOROUGH, ONT., December 6th, 1890.

H. WADE, ESQ.,
Secretary of Agriculture and Arts Association, Toronto, Ont.

DEAR SIR,—I herewith send you a report of the Provincial ploughing match, held at Peterborough on October the 29th. and open to the agricultural divisions Nos. 4, 5 and 6, which includes the Counties of Hastings, Lennox, Addington, Prince Edward, Durham, Northumberland, Peterborough, Victoria, including Haliburton, York, Ontario, Cardwell, Peel, and City of Toronto, and which took place on the estate of the late Jas. Howden, immediately adjoining the Peterborough Central Fair Grounds, which was a very great convenience to visitors, the directors having placed the sheds and stables at their disposal. The number of entries was not nearly as large as was expected by the committee who had the matter in charge, but, probably one cause was that no ploughing match had been held here for seven years, and the local men seemed to be afraid of the western men, who they said, had more practice.

There were four classes of ploughmen on the bills, viz.:—Class 1, open to all comers with any plough. Class 2, open to walking ploughs without wheels, and ploughmen who had not taken a prize in any match since 1885. Class 3, open to boys under 18 years. Class 4. open to boys under 17 years, in stubble.

In the 1st class there were 5 entries, Fred. Waldon, Lakefield; Thos. McLean, York Mills; Wm. Milliken, Hagerman; Geo. Marquis, Sunderland, and Jas. McNeill, Tyrone.

Class 2, 8 entries, Job Wheeler, Warsaw; John Henderson and D. D. Henderson, Lang, P. O.; Wm. Renwick, Lakehurst; Walter McKee, North Monaghan; John Chasty, Lakefield; Jas. Forsyth, Trenton, and John Friese, Peterborough.

Class 3, only 1 entry, and he failed to come in.

Class 4, 4 entries, John Marquis, Sunderland, Frank Buck, Jos. Duffis and Michael Duffis, the last three all of Otonabee Township, County of Peterborough.

There was also an opportunity given to manufacturers or agents, to give a practical trial of sulky ploughs, which was done by Peter Hamilton, of Peterborough, with two ploughs, one a large or three horse, the other a two horse sulky. Mr. E. E. Bowie, who is the local agent for the Cockshut Sulky Plough had two of his on the ground, and Mr. Thos. Cochrane, agent for J. Fleury's Son's, Aurora, had a two furrow sulky, all of which had many admirers, but in point of work the Fleury's two furrow sulky beats them all out, doing its work beautifully from start to finish.

The judges were Mr. McAdam Bell, Campbellford; James Cameron, Roseneath, and Joshua Smithson, Greystock, and the general opinion was that they performed their important duty in a very satisfactory and straightforward manner, which was no easy task where there was so many good ploughmen, and such close competition, the awards were as follows:

Class I.

1st prize, Thos. McLean, York Mills, gold medal, value $40.00.

2nd prize, Geo. Marquis, Sunderland, cistern pump, value $6.00, and cash, $15.00, $21.00.

3rd prize, Fred. Waldon, Lakefield, binder cover, value $3.00, and cash, $12.00, $15.00.

4th prize, Wm. Milliken, Hagerman, clock, value $2.50, and cash, $7.50, $10.00.

Class II.

1st prize, J. Henderson, Lang P. O., pair solid gold cuff buttons, value $6.00, and cash, $24.00, $30.00.

2nd prize, D. D. Henderson, Lang P. O., plough, value $15.00, and cash, $7.00, $22.00.

3rd prize, John Friese, Peterborough, a silver sugar bowl, value $4.00, and cash, $12.00, $16.00.

4th prize, Job Wheeler, Warsaw, a horse collar, value $3.00, and cash $8.00, $11.00.

Class IV. (Boys in Stubble).

1st prize, John Marquis, Sunderland, a plough, value $15.00, and cash, $13.00, $28.00

2nd prize, Frank Buck, Otonabee, cash, $18.00.

3rd prize, Jos. Duffis, Otonabee, cash, $12.00.

4th prize, M. Duffis, Otonabee, cash, $8.00.

The day's proceedings were brought to a close after the reading of the prize list and paying the prizes to the successful competitors, on the ground at the secretary's tent, by the committee inviting the judges and ploughmen to a supper at the Morgan House, an invitation they were ready to accept, and with a zest which only ploughmen have.

Taking all things into consideration we feel our meeting was a decided success, seeing that we have had no matches for a number of years. We believe it will infuse new life into our old ploughmen, and that the boys will also be inspired to take hold and try their skill next year if we have a county match, which I believe we will. The local committee were Robt. Vance, Ida; H. Humphries Hastings, president, East Riding Agricultural Society, and Wm. Rutherford, South Monaghan; president, West Riding Agricultural Society, County of Peterborough, the last named being chairman of the committee (Mr. P. R. Palmer, Belleville, and Mr. J. C. Snell, Edmonton, being on as representing divisions Nos. 4 and 6). We also had a visit from Mr. H. Wade, of Toronto, the secretary of the Agriculture and Arts Association, who expressed himself as being well pleased with the match.

All of which is respectfully submitted.

WM. COLLINS,
Secretary-Treasurer, Ploughing Match.

PLOUGHING MATCH.

Ploughing match of the Wentworth Pioneer Ploughing Club and the Ontario Agriculture and Arts Association to be held on the farm of J. W. Gage, Esq., opposite James' Race Track and present occuiped by J. W. Shuttler, on Wednesday, 5th November, 1890.

PRIZE LIST.

Champion Class Long Ploughs.—For men with long ploughs, open to the world, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd, $6.00; 4th, $4.00; 5th, $2.00.

Second Class.—For men with long ploughs who have never taken a first prize at any open match, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd, $6.00; 4th, $4.00.

Third Class.—For boys under 18 years of age, with long ploughs, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd, $6.00; 4th, $4.00.

Jointer Ploughs—First Class.—For men with jointer ploughs, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd, $6.00; 4th, $4.00.

Second Class.—For men with jointer ploughs who have never taken a first prize in any open match, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd, $6.00; 4th, $4.00; 5th, $2.00.

Third Class.—For boys under 18 years of age with jointer ploughs, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd $6.00; 4th, $4.00.

Sulky Plughs—First Class.—For men with sulky ploughs, 1st prize, by Ontario Agriculture and Arts Association, $15.00; 2nd, $8.00; 3rd, sealskin vest given by Oak Hall, valued at $6.00; 4th, $4.00.

Boy's Class.—For boys under 18 years of age, 1st prize, a jointer plough given by J. H. Grout & Co., Grimsby, valued at $15.00; 2nd, $8.00; 3rd, $6.00 4th, $4.

Special Prize List.

Iron Ploughs—Champion Class, Men.—Whip, valued at $2.00, given by Morgan Bros., Hamilton, for best beginning; sett of whiffletrees, valued at $3.50, given by Patrick Doherty, Ancaster, for best finish.

Second Class, Men.—Whip value $2.00. given by Jolley & Sons, Hamilton, for best beginning; neckyoke, valued at $1.50, given by Charles Goodbrand, Ancaster, for best finish.

Boy's Class.—Pair of boots, value $2.00, given by Robt. Hopkins, Hamilton, for best beginning; hat, valued at $1.00, given by R. P. Leask, Hamilton, for best finish.

Jointer Ploughs—First Class, Men.—Neckyoke, valued at $1.50, given by W. G. Guest, Ancaster, for best beginning; neckyoke, valued at $2.00, given by Thomas Heddle, Caledonia, for best finish.

Second Class, Men.—Dundas *Banner* for one year, for best beginning; weekly *Spectator* for one year, for best finish.

Boy's Class.—Whip, valued at $1.50, given by E. T. Hinds, Caledonia, for best beginning; whip, valued at $2.00, given by John Earl, Caledonia, for best finish.

Sulky Plough—First Class, Men.—5 packages of condition powder, given by B. W. Donnelly, Ancaster, for best beginning; box of cigars, valued at $2.50, given by J. S. Lillis, Hamilton, for best finish.

Boy's Class—Comb and brush, valued at $1.50, given by Blaicher & Reche, Hamilton, for best beginning; weekly *Times* for one year, for best finish.

Best Groomed Horse and Kept Harness.

First Prize.—Silver cup, given by Wm. Hendrie, value $15.00.

Second Prize.—Daily *Times* for one year, valued at $6.00 and $2.00 cash.

Third Prize.—Daily *Spectator* for one year, valued at $6.00.

Fourth Prize.—Daily *Herald* for one year, valued at $3.00 and $1.00 cash.

Fifth Prize.—Hardware, given by Bowman & Moore, Hamilton, value $3.00.

Sixth Prize.—Groceries, by H. W. Sewell, Hamilton, valued at $1.00.

Oldest and Youngest Ploughman.

For the Oldest Ploughman on the field.—Box of cigars. valued at $2.50, given by John Robertson, Hamilton.

For the Youngest Ploughman.—Whip, by E. Kraft. Hamilton. value $1.50.

100 Yards Race—Open to all Ploughmen.

First Prize.—Box cigars, valued at $2.50, given by Thomas Robinson, Hamilton.

Second Prize.—Whip, valued at $1.50, given by Philp & Son, Hamilton.

Third Prize.—Scarf, value at $1.00, given by Gavin Morton, Carluke.

SPECIAL CONTRIBUTIONS OVER $1.00.

George Roach, $5.00 ; ex-Mayor Doran, $5.00 ; P. Grant & Sons, $5.00 ; Geo. E. Tuckett & Son, $5.00 ; W. H. Gillard, $5.00 ; John A. Bruce & Co., $5.00 ; Nicholas Awrey, M.P.P., $5.00 ; Hon. J. M. Gibson, M.P.P., $5.00 ; Lucas, Park & Co., $5.00 ; Davis & McCullough, $3.00 ; Wood, Vallance & Co., $3.00 ; John Dickenson, $2.00 ; Robt. Evans & Co., $2.00 ; John H. Park, $2.00 ; J. W. Gage, $2.00 ; Wm. Gowland, $2.00 ; C. A. McArdle, $2.00.

RULES AND REGULATIONS.

1. No assistance will be allowed to ploughmen, except in setting stakes and measuring lands ; in boy's class assistance will be allowed.
2. The uniform depth to be not less than six inches, except for shaping the land.
3. Each ploughman to plough at the rate of one acre in eighteen hours.
4. All ploughmen to be on the ground by 9.00 o'clock a.m., and ready to start at 9.30 a.m.
5. Any person interfering with the judges in the discharge of their duties will forfeit their prize, if entitled to any.

Directors.—Geo. Roach, John Dickenson, Henry Christie, James Stewart, Judson Horning, E. A. Colquhoun, Alfred Harris, John Young, Samuel Hildreth, Walter Tweedle, E. Corman, Geo. E. Tuckett and J. M. Lottridge.

Honorary Directors.—Messrs. Dawson, Awrey and Rykert, (members of the Ontario Agriculture and Arts Association) ; Robert Smith, Walter Hood, Reginald Æ. Kennedy, J. W. Smith. F. M. Carpenter, M.P., Wm. Hendrie, James Pickard, Isaac Geddes and Simon Hyslop.

MAJOR WALKER, President. JOHN EUSTICE, Vice-President.

ALEX. SIMPSON, 2nd Vice-Prident. DANIEL HAMILTON, Sec'y-Treas.

JOHN B. CALDER, Time Keeper.

RENFORTH, 13th November, 1890

MR. WADE,
Secretary.

DEAR SIR,—I send you a list of the prizes awarded at the Wentworth Pioneer Ploughing Match as promised, also a bill with the prize list.

CHAMPION CLASS—LONG PLOUGHS.

1st prize, Robert Hood, Township Seneca.
2nd prize, Walter Tweedle, Township Saltfleet.
3rd prize, James H. Springstead, Township Saltfleet.
4th prize, Sam Smith, Township Glanford.
5th prize, James Chapman, Township Onondaga

Second Class—Long Ploughs.

1st prize, Wm. Captain, (Indian), Township Tuscarora.
2nd prize, Peter Door, Township Ancaster.
3rd prize, Robert Martin, (Indian), Township Tuscarora.
4th prize, James M. Jackson, Township Caistor.

Boys under 18 years—Long Ploughs.

1st prize, James Hamilton, Township Ancaster.
2nd prize, David Smith, Township Glanford.
3rd prize, Haney Doherty, Township Caistor.

First Class—Jointer Ploughs.

1st prize, Charles Hildreth, Township Saltfleet.
2nd prize, James Hildreth, Township Saltfleet.
3rd prize, Henry Christie, Township Glanford.
4th prize, John English, Township Ancaster.

Second Class—Jointer Ploughs.

1st prize, Joseph Penford, Township Saltfleet.
2nd prize, Robert Kelly, Township Glanford.
3rd prize, Wm. H. Hildreth, Township Caistor.
4th prize, Thomas Bush, Township Ancaster.
5th prize, Willard Smith, Township Glanford.

Boys under 18 years—Jointer Ploughs.

1st prize, Ernest Harris, Township Saltfleet.
2nd prize, Charles E. Horning, Township Ancaster.
3rd prize, Walter Young, Township Caistor.
4th prize, H. M. Christie, Township Glanford.

Sulky Ploughs—First Class.

1st prize, Wm. M. Smith, Township Barton.
2nd prize, A. Pearson, Township Saltfleet.
3rd prize, Joseph Bates, Township Glanford.

Boys under 18—Sulky Ploughs.

1st prize, Edward Marshall, Tapleytown.
2nd prize, Nolton Smuck, Township Glanford.

Best Groomed Horses and Kept Harness.

1st prize, John Young. Township Ancaster.
2nd prize, Wm. M. Smith, Township Barton.
3rd prize, Joseph Penford, Township Saltfleet.
4th prize, David Smith, Township Glanford.
5th prize, John English, Township Ancaster.
6th prize Jonah Marshall, Township Saltfleet.

FOOT RACE—100 YARDS.

1st prize, J. A. McMicking.
2nd prize, R. Martin, (Indian).
3rd prize, W. Smith.
4th prize, A. Pearson

DANIEL HAMILTON,
Secretary-Treasurer Ploughing Match.

I visted the above ploughing match and was very much pleased with the work in all the classes, notwithstanding the wetness of the field; was satisfied that these matches do a great deal of good by stirring up the young men, and causing them to improve themselves. The sulky plough now works very well and is easily managed; at one plough a boy of 10 years was making good work and at another a man of nearly 80. It was unfortunate that N. Awrey, M.P.P., was summoned by sickness in his family just as we were going to drive to the grounds. J. C. Rykert, M.P., of St. Catharines, who always takes great interest in all matters pertaining to agriculture, was there. Mr. Wm. Dawson, of Vittoria, the other member of the Council for that division was also unfortunately detained at home. It was a lovely day and everything passed off well. A good lunch was provided for the officials and ploughmen. Mr. Rykert and I visited the well-known farm of Mr. Tuckett, and inspected his horses.

H. WADE,
Secretary.

PROVINCIAL PLOUGHING MATCH.

A Provincial ploughing match will be held on the farm of Mr. J. McDonald, Con. 6, Vespra, three miles from Barrie, on Wednesday, October 22nd, under the auspices of the Agriculture and Arts Association of Ontario.

PRIZES.

1. First class, open to all, any kind of a plough, 1st $20.00, 2nd $10.00.
2. Second class, open to men who have not taken a medal or diploma. Wrought iron plough barred. 1st $20.00, 2nd $10.00, 3rd $7.00, 4th $4.50.
3. Open to boys from 16 to 19 years, on stubble ground, 1st $10.00, 2nd $5.00, 3rd $2.50, 4th $1.00.
4. Open to boys under 16 years, on stubble ground, 1st $8.00, 2nd $4.00, 3rd $2.00, 4th $1.00.
5. Open to Sulky ploughs, any make, 1st $8.00, 2nd $4.00, 3rd $2.00, 4th $1.00.

Parties competing for any of the above prizes must pay the sum of one dollar to the secretary to help defray expenses. Competitors to draw for position on grounds on the morning of the match. Ploughing to begin at 10 o'clock a.m.

Committee.—Messrs. Jno. Sissons, W. Orok, H. Chappel and Dr. Bailey.

J. J. BROWN,
Secretary

To the members of the Agriculture and Arts Association :

Gentlemen,—The following is a report of the ploughing match held under the auspices of this association for the districts.

The day being fine a large number attended to witness the ploughman's skill or to enter into competition for the prizes offered, there being at least 500 people on the ground.

The competion amongst over thirty ploughmen for the first place was very keen, and on the whole the work well done. Much interest was taken by the spectators and great satisfaction expressed on account of the liberal grant given by this association which has prompted a number to offer subscriptions towards a county match next year. The Barrie *Advance* congratulated the association on the success of the match and feels satisfed, with more attention given to this branch of industry better results would accrue to the tillers of the soil.

The following is the prize list :

First Class—Men.

1st, Spencer Crowley, $20.00.
2nd, Wm. Addison, $10.00.
3rd, Dawson Thomas, $5.00.

Second Class—Men

1st, W. H. Pattison, Innisfil, $20.00.
2nd, D. Beath, Oro, $10.00.
3rd, R. Tranaghan, Vespra, $7.00.
4th, Jos. Rand, Oro, $4.00.

First Class—Boys from 16 to 19 years.

1st, Wm. Chappell, Oro, $10.00.
2nd, Geo. Nelson, Innisfil, $5.00.
3rd, Chas. Wattie, Vespra, $2.50.
4th, Ray McKinley, Vespra, $1.00.

Second Class—Boys under 16 years.

1st, Jos. Gearns, Oro, $8.00.
2nd, Andrew Standen, Vespra. $4.00.
3rd, Wm. Campbell, Oro, $2.00.
4th, Wm. Oronek, Vespra, $1.00,

Sulky Ploughs.

1st, W, G. Ross, $8.00.
2nd, R. Ross, $4.90.
3rd, P. Knapp, $2.00.
4th, Geo. Hart, $1.00.
Total for prizes, $125.00. Expenses $28.75.

The judges in the first and second classes: F. Ambler, Simon Chappell, Geo. Nelson.

Judges in third class and sulky ploughs: E. A. Little, Wm. Patterson, Wm. Warnico.

All which is respectfully submitted,

Jonathan Sissons,
Crown Hill.

Moved by Mr Snell, seconded by Mr. Morgan—

That the report of Mr. Secretary Wade on his recent trip to Great Britian giving his impressions of British agriculture and agricultural shows be accepted and ordered to be printed in the annual report of the association.

Moved by Mr. Snell, seconded by Mr. Simmons—

That provided a suitable building can be secured this association hold a spring show in the city of Toronto in conjunction with the Clydesdale and other stock breeders' associations.

Moved by R. Vance, seconded by Mr. Dawson

That as the Prince of Wales' Prize is still in our hands we recommend that it be offered at our spring show in Toronto in March, if we hold one, if not then that it be given to the Clydesdale Association for their spring show in lieu, of the gold medal usually offered.

Moved by Mr. Awrey, seconded by Mr. McPherson

That this Council regrets to learn of the intentions of P. R. Palmer, Esq., to no longer place his services at the disposal of No. 4 Division as their representative on the Board of Agriculture and Arts, and further expresses the hope that his life may be long spared to render service to his province.

Moved by N. Awrey, seconded by J. Sissons

That an additional sum be granted the Fat Stock Club of Guelph to make up our proportion of the amount exceeding $500 on the Prize List. Carried.

A committee consisting of the president, A. Rawlings, N. Awrey, H. Wade and the Hon. John Dryden were appointed to wait upon the mayor of Toronto at an early state, *re* spring show buildings.

REPORT OF THE SEVENTH ANNUAL ONTARIO PROVINCIAL FAT STOCK SHOW, HELD UNDER THE AUSPICES OF THE AGRICULTURE AND ARTS ASSOCIATION OF ONTARIO AND THE FAT STOCK CLUB OF GUELPH, IN THE CITY OF GUELPH, DECEMBER 10TH AND 11TH, 1890.

OFFICERS:

President	J. C. Snell, Edmonton.
1st Vice-President	Walter West, Guelph.
Treasurer	J. W. Easton, Guelph.
Secretary	Henry Wade, Toronto.
General Superintendent	H. Wright, Guelph.

COMMITTEE OF MANAGEMENT

From the Agriculture and Arts Association of Ontario.

Messrs. J. C. Snell, Edmonton; J. C. Rykert, M.P., St. Catharines; R. Vance, Ida; N. Awrey, M.P.P., Binbrook; C. M. Simmons, Ivan.

From the Fat Stock Club of Guelph.

Walter West, Guelph.
W. Sharpe, Everton.
J. M. Tyson, Guelph.
Prof. T. W. Shaw, O. A. C., Guelph.
James Taylor, Mosborough.
James Anderson, Guelph.
William McCrae, Guelph.
H. Wright, Guelph.
L. O. Barber, Guelph
Wm. Cowan Guelph.
W. R. Elliott, Guelph.
E. Parkenson, Eramosa.
Alf. Hales, Guelph.
Walter Laing, Eden Mills.
W. Laidlaw, Guelph.
R. Buchanan, Gourock.
Robert Irving, Nassagaweya.
George Taylor, Rockwood.
Thos. Waters, Rockwood.
J. W. Easton, Guelph.
James Millar, Guelph.

Judges on Cattle.—G. F. Frankland, Toronto; Richard Gibson, Delaware; J. W. Dunn, Toronto.

CLASS I.

THOROUGHBRED CATTLE OF ANY BREED.

SEC. 1.—STEER, 1 AND UNDER 3 YEARS AND 6 MONTHS.

1st prize, $15. 2nd prize, $10. 3rd prize, $5.

1. Thos. Nelson & Sons, Bow Park, Brantford, "Ingram's Faith," Jan. 27th, 1889; 682 days, S H.
2. do do do do "Young Ingram," Feb. 12th, 1889; 669 days, S H
3. do do do do "Cumbrian," Feb. 22nd, 1889, 656 days, S H.
4. do do do do "Douglas," Jan. 10th, 1889, 699 days, S H.
5. Wm. Snyder & Son, Brampton, "Baron Knoyle, 16th=9495=June 25th, 1887, 1263 days, S H.
6. J. & W. B. Watt, Salem, "Soloman."
7. Jas. Oke & Sons, Alvinston, "Snow Flake," S H.

1st premium to Soloman, exhibited by J. & W. B. Watt, Salem.
2nd do to Ingram's Faith, exhibited by Thos. Nelson & Sons, Bow Park, Brantford.
3rd do to Steer, exhibited by J. Oke & Sons, Alvinston.

SEC. 2.—COW THAT HAS HAD A CALF 3 YEARS AND OVER.

1st prize, $12. 2nd prize, $8. 3rd prize, $4.

1. Thos. Ballantyne & Son, Stratford, "2nd Missie of Midpath,"=12594=Nov. 10th, '86, 1490 dy's, SH.
2. J. & W. B. Watt, Salem, "Fancy Princess 2nd,"=9069=Dec. 18th, 1885, 1817, S H.
3. Robert Dow, Barnett.

1st premium to 2nd Missie of Midpath=12594=exhibited by Thos. Ballantyne & Sons, Stratford.
2nd do to Fancy Princess 2nd=9069= do J. & W. Watt, Salem.
3rd do to cow exhibited by Robert Dow, Barnett.

CLASS II.

GRADES OR CROSSES OF ANY BREED.

SEC. 1—STEER OR HEIFER 3 AND UNDER 4 YEARS.

1st prize, $15. 2nd prize, $10. 3rd prize, $5.

1. Jas. Oke & Sons, Alvinston, "White Prince."
2. do do do "Maud."
3. F. McCallum, Milton, "McCallum More."

1st premium to steer White Prince, exhibited by Jas. Oke & Sons, Alvinston.
2nd do heifer Maud, do do do do
3rd do steer McCallum More do F. McCallum, Milton.

SEC. 2.—STEER 2 AND UNDER 3 YEARS.

1st prize, $15. 2nd prize, $10. 3rd prize, $5.

1. Walter West, Guelph, "Duke."
2. do do "Murray."
3. Wm. Smith, Eramosa, "Dominion Boy."
4. Jas. Oke & Sons, Alvinston, "Davy."
5. Alex. Brockie, Fergus, "Duke."

1st premium to Dominion Boy, exhibited by Wm. Smith, Eramosa.
2nd do Davy, do Jas. Oke & Sons, Alvinston.
3rd do Duke, do Alex. Brockie, Fergus.

SEC. 3.—STEER 9 MONTHS AND UNDER 2 YEARS.

1st prize, $12. 2nd prize, $8. 3rd prize, $4.

1. Wm. Sharp & Sons, Everton, "Duke of Fife."
2. Jas. Oke & Sons, Alvinston, "Little Dainty."
3. Thos. Waters, Rockwood, "Sandy," March 5th, 1889.

1st premium to Little Dainty, exhibited by Jas. Oke & Sons, Alvinston.
2nd do Sandy, do Thos. Waters, Rockwood.
3rd do Duke of Fife, do Wm. Sharp & Sons, Everton.

SEC. 4.—COW THAT HAS HAD A CALF, 3 YEARS AND OVER.

1st prize, $15. 2nd prize, $10. 3rd prize, $5.

1. Wm. Sharp & Sons, Everton, "Bessie."
2. Jas. Oke & Sons, Alvinston, "Bella."
3. Wm. Snyder & Sons, Brampton.

1st	premium to	cow,	exhibited by	Wm. Snyder & Sons, Brampton.
2nd	do	Bessie,	do	Wm. Sharp & Sons, Everton.
3rd	do	Bella,	do	Jas. Oke & Sons, Alvinston.

SEC. 5.—HEIFER UNDER 3 YEARS AND OVER 9 MONTHS.

1st prize, $12. 2nd prize, $8. 3rd prize, $4.

1. Wm. Sharp & Sons, Everton, "Lillie."
2. Jas. Oke & Sons, Alvinston, "Lady."
3. do do do "Daisy."
4. J. & W. B. Watt, Salem, "Annie Rooney."
5. Wm. Snyder & Sons, Brampton.

1st	premium to	Annie Rooney,	exhibited by	J. & W. B. Watt, Salem.
2nd	do	Daisy,	do	Jas. Oke & Sons, Alvinston.
3rd	do	heifer,	do	Wm. Snyder & Sons, Brampton.

SEC. 6.—CALF, STEER OR HEIFER UNDER 9 MONTHS.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. Wm. Spencer, Guelph, "Lady Garfield."
2. do do "Maggie Bell."

1st	premium to	Lady Garfield,	exhibited by	Wm. Spincer,	Guelph.
2nd	do	Maggie Bell,	do	do	do

CLASS III.

SWEEPSTAKES FOR CATTLE.

SEC. 1.—BEST STEER OF ANY AGE OR BREED.

Silver Cup, value $60, by "Farmers Advocate," London.

1. Wm. Sharp & Sons, Everton.
2. Jas. Oke & Sons, Alvinston.
3. Thos. Nelson & Sons, Bow Park, Brantford,
4. Wm. Snyder & Sons, Brampton,
5. J. & W. B. Watt, Salem.
6. Alex. Brockie, Fergus.
7. F. McCallum, Milton.
8. Walter West, Guelph.
9. Wm. Smith, Eramosa.
10. T. Waters, Rockwood.

Premium to "White Prince," exhibited by Jas. Oke & Son, Alvinston.

SEC. 2.—BEST FEMALE OF ANY AGE OR BREED.

$15, by Chris. Reinhart, Guelph.

1. Wm. Sharp & Sons, Everton.
2. Thos. Ballantyne & Son, Stratford,
3. Jas. Oke & Sons, Alvinston.
4. Wm. Snyder & Sons, Brampton.
5. J. & W. B. Watt, Salem,
6. Robert Dow, Barnett.
7. Wm. Spencer, Guelph.

Premium to "Maud," exhibited by Jas. Oke & Sons, Alvinston.

CLASS IV.

SPECIAL.

BEST FAT ANIMAL, ANY AGE.

A Cup, known as the "McAteer Cup,' value $60, to be won twice by one man and with a different animal. The Cup to remain in possession of the club until won the second time. Second year of competition. Won first year by Thos. Ballantyne, Stratford.

1. Wm. Sharp & Sons, Everton.
2. Thos. Ballantyne & Son, Stratford.
3. Jas. Oke & Sons, Alvinston.
4. Thos. Nelson & Sons, Bow Park, Brantford.
5. Wm. Snyder & Sons, Brampton.
6. J. & W. B. Watt, Salem.
7. Alex. Brockie, Fergus.
8. F. McCallum, Milton.
9. Walter West, Guelph.
10. Wm. Smith, Eramosa.
11. T. Waters, Rockwood.
12. Robert Daw, Barnett.
13. W. Spincer, Guelph.

Premium to 2nd Missie of Neidpath, =12594= exhibited by Thos. Ballantyne & Sons, Stratford.

JUDGES ON SHEEP.—W. G. Gam, Fergus; Henry Arkell, Arkell; Wm. Thomson, Elora.

CLASS V.

SHEEP—LONG WOOLED, LINCOLNS, LEICESTERS, COTSWOLDS AND THEIR CROSSES.

SEC. 1.—WETHER, 2 AND UNDER 3 YEARS.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. John Rutherford, Roseville, "Sandy."
2. do do "Robin Hood."
3. do do "Dick."

1st premium to Sandy, exhibited by John Rutherford, Roseville.
2nd do Robin Hood, do do do
3rd do Dick, do do do

SEC. 2.—WETHER, 1 AND UNDER 2 YEARS.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. John Kelly, jr., Shakespeare, "Tom," Leicester.
2. John Rutherford, Roseville, "Sambo."
3. Mrs. Eliza A. Somers, St. Marys, "Duke," April 7th, 1889, 612 days, Leicester.
4. Robt. Irving, Nassagaweya.
5. T. Waters, Rockwood, "Prince of Wales," Cotswold.
6. do do "Cotswold Chief," Cotswold.
7. Geo. Weeks, Glanworth, "Glanworth Chief."

1st premium to Duke, exhibited by Mrs. Elizabeth A. Somers, St. Marys.
2nd do wether, do Robt. Irving, Nassagaweya.
3rd do Sambo, do John Rutherford, Roseville.

SEC. 3.—WETHER UNDER 1 YEAR.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. John Kelly, jr., Shakespeare, "Dick," Leicester.
2. W. E. Wright, Glanworth.
3. do do do
4. W. H. Beattie, Wilton Grove, "Beattie's No. 1."
5. do do do "Beattie's No. 2."
6. John Rutherford, Roseville, "Andrew.
7. do do "Peter."
8. T. Waters, Rockwood, "Cotswold Lad," Cotswold.
9. Jas. Laidlaw, Guelph, "Tom."
10. W. R. Fisk, New Germany.
11. W. E. Wright, Glanworth, "Jack."

1st premium to Dick, exhibited by J. Kelly, jr., Shakespeare.
2nd do Cotswold Lad do T. Waters, Rockwood.
3rd do wether, do W. E. Wright, Glanworth.

Sec. 4.—Ewe, 2 years and over.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. John Kelly, jr., Shakespeare, "Susan," Leicester.
2. Wm. Oliver, Avonbank, "Lady Geary."
3. Robert Irving, Nassagaweya.
4. do do
5. Thos. Waters, Rockwood, "Maud."
6. W. H. Beattie, Wilton Grove.
7. L. O. Barber, Guelph.

1st premium to ewe, exhibited by W. H. Beattie, Wilton Grove.
2nd do Lady Geary, do Wm. Oliver, Avonbank.
3rd do Susan, do John Kelly, jr., Shakespeare.

Sec. 5.—Ewe, 1 and under 2 years.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. John Kelly, jr., Shakespeare, "Mary." Leicester.

1st premium to Mary, exhibited by John Kelly, jr., Shakespeare.

Sec. 6.—Ewe undes 1 year.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. John Kelly, jr., Shakespeare, "Jeannie," Leicester.
2. W. H. Beattie, Wilton Grove, "Beattie's No. 3."
3. do do do "Beattie's No. 4."
4. Jas. Laidlaw, Guelph, "Bell."
5. Thos. Waters, Rockwood, "May."

1st premium to Jeannie, exhibited by John Kelly, jr., Shakespeare.
2nd do Bell, do W. H. Beattie, Wilton Grove.
3rd do May, do Thos. Waters, Rockwood.

Sec. 7.—Pen of 5 Lambs.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. W. H. Beattie, Wilton Grove.
2. Gee. Taylor, Rockwood, "Minnie," "Kate," "Mary," "Ettie," "Ruth."
3. Jas. Laidlaw, Guelph.
4. W. E. Wright, Glanworth.
5. Jas. Laidlaw, Guelph.

1st premium to Geo. Taylor, Rockwood.
2nd do Jas Laidlaw, Guelph.
3rd do do do

CLASS VI.

MIDDLE WOOLLED SHEEP, DOWNS AND THEIR CROSSES.

Sec. 1—Wether, 2 and under 3 years.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. Richard Gibson, Delaware, "His Lordship."
2. John Rutherford, Roseville, "Campbell."
3. do do "Franklin."
4. do do "Stone."
5. Jas. G. Wright, Guelph, "Fritz."

1st premium to Campbell, exhibited by J. Rutherford, Roseville.
2 nd do His Lordship, do Richard Gibson, Delaware.
3rd do Franklin, do J. Rutherford, Roseville.

Sec. 2.—Wether, 1 and under 2 Years.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. John Rutherford, Roseville, "Harry."
2. do do "John."
3. do do "Mane."

1st premium to Harry, exhibited by John Rutherford, Roseville.
2nd do John, do do
3rd do Mane, do do

Sec. 3.—Wether, under 1 Year.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. W. E. Wright, Glanworth.
2. W. H. Beattie, Wilton Grove, "Beattie's No. 5."
3. John Rutherford, Roseville, "Cole."
4. do do "Winter."
5. W. R. Fisk, New Germany.

1st premium to Wether, exhibited by W. R. Fisk, New Germany.
2nd do Cole, do John Rutherford, Roseville.
3rd do Winter, do do do

Sec. 4.—Ewe, 2 Years and over.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. John Hill, Cumnock, "Nancy."
2. do do "Rose."
3. W. E. Wright, Glanworth.
4. W. H. Beattie, Wilton Grove, "Beattie's No. 6."
5. do do "Beattie's No. 7."
6. Rebert Irving, Nassagaweya.
7. do do
8. do do

1st premium to Ewe, exhibited by W. E. Wright, Glanworth.
2nd do do do Robt. Irving Nassagaweya.
3rd do do do do do

Sec. 5. –Ewe, 1 and under 2 Years.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. W. H. Beattie, Wilton Grove, "Beattie's No. 8."
2. do do "Beattie's No. 9."
3. do do

1st premium to Beattie's No. 8, exhibited by W. H. Beattie, Wilton Grove.
2nd do do No. 9 do do
3rd do do do do

Sec. 6.—Ewe, under 1 Year.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. W. H. Beattie, Wilton Grove, "Beattie's No. 10."
2. do do "Beattie's No. 11."
3. W. R. Fisk, New Germany.

1st premium to Beattie's No. 10, exhibited by W. H. Beattic, Wilton Grove.
2nd do exhibited by W. R. Fisk, New Germany.
2rd do Beattie's No. 11," exhibited by W. H. Beattie, Wilton Grove.

Sec. 7.—Pen of Five Lambs.

1. W. H. Beattie, Wilton Grove.
2. John Rutherford, Roseville.
3. Jas. Laidlaw, Guelph.
4. W. R. Fisk, New Germany.

1st premium to Jas. Laidlaw, Guelph.
2nd do W. R. Fisk, New Germany.
3rd do John Rutherford, Roseville.

CLASS VII.

SWEEPSTAKES FOR SHEEP.

Sec 1.—Wether, any Age or Breed.

Prize $8.

1. John Kelly, jr., Shakespeare.
2. Richard Gibson, Delaware, "His Lordship."
3. John Rutherford, Roseville.
4. W. H. Beattie, Wilton Grove.
5. W. E. Wright, Glanworth.
6. Mrs. E. A. Somers, St. Mary's.
7. Robt. Irving, Nassagaweya.
8. T. Waters, Rockwood.
9. Geo. Weeks, Glanworth.
10. J. Laidlaw, Guelph.
11. J. G. Wright, Guelph.
12. W. R. Fisk, New Germany.
13. John Hill, Cumnock.

Premium to John Rutherford, Roseville

Sec. 2.—Ewe, any Age or Breed.

Prize, $6.

1. John Hill, Cumnock, "Nancy." Shr.
2. John Kelly, jr., Shakespeare. Lei.
3. Wm. Oliver, Avonbank, "Lady Geary."
4. W. E. Wright, Glanwotth.
5. Robt. Irving, Nassagaweya.
6. Thos. Waters, Rockwood.
7. W. H. Beattie, Wilton Grove.
8. L. O. Barber, Guelph.
9. W. R. Fisk, New Germany.

Premium to W, E. Wright, Glanworth.

Judges on Hogs.—John Tuck, Mosborough ; J. A. McHardy, Guelph ; John Alison, jr., Galt.

1st premium to Johnnie, exhibited by R. Dorsey, Burnhamthorpe.

CLASS VIII.

HOGS, ANY BREED.

Sec. 1.—Barrow, 1 and under 2 Years.

1st prize $8. 2nd prize, $6. 3rd prize, $4.

1. R. Dorsey, Burnhamthorpe, "Johnnie."

Sec. 2.—Barrow under 1 Year.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. Thos. McCrae, Guelph, "Sambo,"
2. Geo. Fyfe, Gourock.

1st premium to Barrow, exhibited by Geo. Fyfe, Gourock.
2nd do Sambo, do Thos. McCrae, Guelph.

Sec. 3.—Sow, 1 and under 2 Years.

1st prize, $8. 2nd prize, $6. 3rd prize, $4.

1. R. Dorsey, Burnhamthorpe, "Jennie,"
2. do do "Lizzie."
3. Robt. Irving, Nassagaweya.
4. Robt. Buchanan, Gourock "Bessie".
5. L. O. Barber, Guelph.
6. do do

1st premium to Sow, exhibited by Robt. Irving, Nassagaweya.
2nd do Jennie, R. Dorsey, Burnhamthorpe.
3rd do Bessie, Robt. Buchanan, Gourock.

Sec. 4.—Sow, under 1 Year.

1st prize, $6. 2nd prize, $5. 3rd prize, $3.

1. Thos. McCrae, Guelph, "Sally."
2. R. Dorsey, Burnhamthorpe, "Florence Nightingale."
3. Geo. Fyfe, Gourock.
4. Geo. Clayton, Morden; "Bessie."

1st premium to Sow, exhibited by Geo. Fyfe, Gourock.
2nd do Bessie, do Geo. Clayton, Morden.
3rd do Florence Nightingale, exhibited by R. Dorsey, Burnhamthorpe.

CLASS IX.

SWEEPSTAKES FOR HOGS.

Sec. 1.—Best Hog of any Age Breed or Sex.

Prize, $8.

1. Thos. McCrae, Guelph.
2. R. Dorsey, Burnhamthorpe.
3. Robt. Irving, Nassagaweya.
4. Robt. Buchanan, Gourock.
6. Geo. Fyfe, do
6. Geo. Clayton, Morden.
7. L. O. Barber, Guelph.

Premium to Robt. Irving, Nassagaweya.

CLASS X.

DRESSED POULTRY, DRAWN, HATCHED IN 1890.

Judges on Poulery.—Jas. Goldie, Guelph; Geo. Tolton, Guelph; G. Minton, Guelph.

Sec. 1.—Pair Dressed Turkey Cockerels.

1st prize, $2.50. 2nd prize, $1.50. 3rd prize, $1.

1. Wm. Ycung, Guelph.
2. Jos. Tomalin, Brampton.
3. Geo. Fyfe, Gourock.
4. J. Anderson, Guelph.
5. W. H. Beattie, Wilton Grove.
6. Walter Laing, Eden Mills.

1st premium to Jos. Tomalin, Brampton.
2nd do Geo. Fyfe, Gourock.
3rd do Wm. Young, Guelph.

Sec. 2.—Pair Dressed Turkey Pullets.

1st prize, $2.50. 2nd prize, $1.50. 3rd prize, $1.

1. Wm. Young, Guelph.
2. Jos. Tomalin, Brampton.
3. do do
4. Robt. Buchanan, Gourock.
5, Geo. Fyfe, do
6, J. Anderson, Guelph.

1st premium to Jos. Tomalin, Brampton.
2nd do Geo. Fyfe, Gourock.
3rd do J. Anderson. Guelph.

Sho. 3.—Pair Dressed Ganders.

1st prize, $2.50. 2nd prize, $1.50. 3rd prize, $1.

1. Jos. Tomalin, Brampton.
2. Robt. Buchanan, Gourock.
3. J. Anderson, Guelph.

1st premium to Robt. Buchanan, Gourock.
2nd do Jos. Tomalin, Brampton.
3rd do J. Anderson, Guelph.

Sec. 4.—Pair Dressed Geese.

1st prize, $2.50. 2nd prize, $1.50. 3rd prize, $1.

1. Jos. Tomalin, Brampton.
2. Robt. Buchanan, Gourock.
3. J. Anderson, Guelph.
4. Walter Laing, Guelph.

1st premium to Robt. Buchanan, Gourock.
3nd do Walter Laing, Eden Mills.
3rd do Jos. Tomalin, Brampton.

SEC. 5.—PAIR DRESSED DRAKES.

1st prize, $2. 2nd prize, $1.50. 3rd prize, $1.

1. Jos. Tomalin, Brampton.
2. do do
3. Mrs. Thos. Card, Guelph.
4. Robt. Buchanan, Gourock.
5. Geo. Fyfe, Gourock.
6 J. Anderson, Guelph.
7. Walter Laing, Eden Mills.

1st premium to Jos. Tomalin, Brampton.
2ud do Geo. Fyfe, Gourock.
3rd do Mrs. Thos. Card, Guelph.

SEC. 6.—PAIR DRESSED DUCKS.

1st prize, $2. 2nd prize, $1.50. 3rd prize, $1.

1. Jos. Tomalin, Brampton.
2. Mrs. Thos. Card, Guelph.
3. Robt. Buchanan, Gourock.
4. Geo. Fyfe, do
5. J. Anderson, Guelph.
6. Walter Laing, Eden Mills.

1st premium to Jos. Tomalin, Brampton.
2nd do Geo. Fyfe, Gourock.
3rd do Mrs. Thos. Card, Guelph.

SEC. 7.—PAIR DRESSED COCKERELS.

1st prize, $2. 2nd prize, $1.50. 3rd prize, $1.

1. Jos. Tomalin, Brampton.
2. Mrs. Thos. Card, Guelph.
3. Robt. Buchanan, Gourock.
4. Geo. Fyfe, do
5. do do
6. Walter Laing, Guelph.

1st premium to Mrs. Thos. Card, Guelph.
2nd do Robt. Buchanan, Gourock.
3rd do Geo. Fyfe, do

SEC. 8.—PAIR DRESSED PULLETS.

1st prize, $2. 2nd prize, $1-50. 3rd prize, $1.

1. Jos. Tomalin, Brampton.
2. Mrs. Thos. Card, Guelph.
3. Robt. Buchanan, Gourock.
4. Geo. Fyfe, do
5. Walter Laing, Guelph.

1st premium to Mrs. Thos. Card, Guelph.
2nd do Walter Laing, Guelph.
3rd do Geo. Fyfe, Gourock.

SEC. 9.—DRESSED TURKEY-COCK, ANY AGE.

1st prize, $3. 2nd prize, $2.

1. Jos. Tomalin, Brampton.
2. Geo. Fyfe. Gourock.
3. J. Anderson, Guelph.
4. J. Tomalin, Brampton.
5. Walter Laing, Guelph.

1st premium to Jos. Tomalin, Brampton.
2nd do J. Anderson, Guelph.

SEC. 10.—DISPLAY OF DRESSED POULTRY HATCHED IN 1890.

Prize, $5.

1. Jos. Tomalin, Brampton.
2. Robt. Buchanan, Gourock.
3. Geo. Fyfe, do
4. Walter Laing, Guelph.

Premium to Jos. Tomalin, Brampton.
Highly commended to Geo. Fyfe, Gourock.

SEC. 11.—HEAVIEST TURKEY.

Prize, $2.50.

1. Jos. Tomalin, Brampton.
2. W. H. Beattie, Wilton Grove.
3. Walter Laing, Guelph.

Premium to Jos. Tomalin, Brampton.

The seventh annual Ontario Provincial Fat Stock Show, held in Guelph this year under the auspices of the Agriculture and Arts Association of Ontario and the Guelph Fat Stock Club, was a very successful one, both in point of exhibits and attendance. Part of the Western Hotel stables had been set apart for the accommodation of the cattle, a good part of the yard had been roofed in as a show ring and to accommodate the sheep and pigs, while five electric lights lit up the place in great style, and all the inside accommodation Mr. McAteer had was placed at the disposal of the officers and directors of the show. This was all done without charge, and many were the complimentary allusions heard on all sides as to Mr. McAteer's generosity and public spirit. Though the display of stock was not equal in quantity to those of the old days, and the prizes, too, were not so large, yet a vast improvement is noticeable in the quality, and nothing but a very extra beast now stands any sort of a show. All the entries were on the ground by Wednesday afternoon, and the judging took place in the evening before a large crowd of deeply interested visitors. Ald. Frankland's object lessons as to the kind of animal to raise for the English market were much relished by his auditors.

FINANCIAL RESULTS OF SEVENTH PROVINCIAL FAT STOCK SHOW HELD IN GUELPH IN 1890.

J. W. EASTON, Treasurer, in account with Agriculture and Arts Association.

DR.

To cash cheque from A. & A. Association	$300 00
" Guelph Fat Stock club	200 00
" entry fees	169 50
" *Farmers' Advocate* cup, value	60 00
" McAteer cup, value	60 00
" cheque Ag. & Arts, additional	37 50
" gates	56 25
	$883 25

CR.

By cash prizes	$562 50
plate donations	120 00
judges	15 00
printing and advertising	85 45
general expenses, Toronto	29 25
" Guelph	71 05
	$883 25

Examined and found correct.

HENRY WADE,
Auditor.

REPORT OF A VISIT TO ENGLAND AND SCOTLAND IN 1890, BY HENRY WADE, SECRETARY AGRICULTURE AND ARTS ASSOCIATION.

I have concluded to make this report somewhat in the form of a diary, enumerating from day to day during my visit what transpired. As an ocean voyage is familiar to a great many people, it will suffice to say that on a Sunday morning, the first day of June, we arrived at the cove of Moville. What a change from the ocean to see the beautiful hills and fields of old Ireland, so green and inviting to the eye, also our first old castle ruins was observed in this delicious cove. The afternoon was spent in steaming down the Irish Sea, seeing Scotland and Ireland on either side of us and later on the Isle of Man, thus viewing at one time the land belonging to all three of these wonderful islands, which jointly make the most wonderful and beautiful country in the world. We landed at Liverpool about nine o'clock in the morning, left there at eleven for London. Before reaching Crewe, a city of over 24,000 inhabitants, we pass through a fertile district noted for Cheshire cheese; the next large town is Stafford, 68 miles on our journey, and is the county town of Staffordshire. Lichfield is the next large town, has a very fine cathedral, and is the birthplace of Dr. Johnston. We pass also through Nuneaton, Coventry and Rugby, all noted towns, and then rapidly approach London, passing Harrow-on-the-Hill, a noted school for boys. We arrived at Euston at 3.30 p.m. after a very pleasant ride in a little bit of a carriage, as they call them; the country was beautiful, everything in the way of flowers were in full bloom and the trees in full leaf, the grain quite high and green, while in places they had commenced to cut the grass; the hedges and roads are beautiful, nothing is straight neither roads, hedges or fields; the dwellings as a rule are very old, chiefly built of brick and in some cases still covered with straw thatch. Some hedges were nicely clipped and some had grown up straggling and full of flower. After a day's rest in London I took train to see the great Derby; unfortunately it rained almost continuously, which quite spoiled the fun of the sporting community. I never saw so many umbrellas in my life; it was surmised that there were about a million people on the grounds. The favourite, Surefoot, did not win, but Sainfoin did. It was a wonderful sight, every kind of conveyance from the four-in-hand drag down to the costermonger's donkey cart was there, and the amount of lunching done was something marvellous. I returned to the city again in the evening. The next day was spent seeing some of the sights in the great city.

Early on Friday, the 6th of May, I left for the ancient city of Rochester to visit the Bath and West of England, the second show in importance in England. Rochester is only about thirty miles from London. I went up the London, Chatham and Dover railroad and reached my destination by 9.30 a.m. The journey down through the fertile county of Kent was a pleasure, everything so beautifully green. The city is on the banks of the Medway river, which is navigable from the ocean, all the way up to the city. It was walled and fortified 1,290 years ago. Some of the old walls are visible yet. A wonderful bridge spans the river to Stroad, which has been built lately. It takes the place of one that had been in existence 460 years, and was built by Richard Knowles, a noted general in the reigns of Richard II. and Edward III. On the Rochester side is an esplanade, with an old inn of very curious architecture, and above on Roley Hill is the celebrated ruins of the castle. It is a Norman relic, and what remains standing is 100 feet high, and the wall at the base is 13 feet thick and at the top eight feet. This castle was built in 1077 on the site of a still older one; the mortar is harder than the stones. The castle was besieged by King John in 1215, and partly destroyed. The openings in the walls are very strange, some to carry off smoke, and others for other purposes. The ruins are nearly covered with ivy, with branches at the base nearly six inches in diameter. They are the home of pigeons innumerable. The remains of an old draw-bridge are plainly visible. The Rochester cathedral is also one of the oldest in the country, having been built A.D. 600. It is very curious and old fashioned, and does not look like a place of worship for modern people. The curious old fashioned tombs and inscriptions are a marvel to a Canadian. The work of restoring the cathedral is going on, not making it modern but restoring it. After gazing on all these historic scenes I made my way to the show grounds, at which I was more at home, amongst modern people and animals. The management was very kind and gave me several introductions to English exhibitors, and later on I met W. H. Beaty, of Wilton Grove, and D. H. Dale, of Glendale, who were over buying sheep. We lunched together and enjoyed a chat. I have given a description of this show in the *Live Stock Journal* of Toronto, so do not go into details here, and as the English shows are pretty much all of the same character, I now give a general description of my impressions of English and Scotch shows that I visited during my trip, and my recollections of the grand stock exhibited.

The men and women engaged in agriculture, from the nobleman down through the ranks of the gentleman farmer, the tenant farmer, and the farm labourer constitute a fine class. They are happy, healthy, jolly, well-to-do, well informed, splendid judges of animals and have not the care-worn, anxious bilious look of many of our American farmers. When it is considered that an ordinary fat Southdown sheep can be sold on the farm for $15, and an average fat beast for $100, that their pastures are good all the year round, and that they do not raise much grain, you do not wonder at the magnificent appearance of their countrymen and women. Consequently they do not work as hard as Canadians. This is one of the impressions brought away from an English show.

Another is that they understand the art of raising and breeding animals better than we do. Their horses are the best in the world. They have them of all kinds and sizes, from the Shetland pony to the immense cart-horse, and the intervening breeds are there in rich perfection. It is the country to which we all go to renew our stock. Their hunters are unsurpassed, their racers and coach horses unrivalled, and all well broken and groomed. To a great extent horses are the attraction to an English show. The grand stand is crowded all the afternoon when the prize horses are in the ring. After that comes the jumping of hurdles and this mild excitement beyond the legitimate show, quite satisfies the people who are watching. In the counties the horses, as well as the riders, principally gentlemen, are well known, and the jumping power of the horses are well criticised, the ladies being capital judges.

Their cattle also are of the best, each county or group of counties having a breed of its own originated at home. The Devons are found in the south of England, the Sussex and Herefords in the centre of England, and the Shorthorns in the north. I do not say that the other breeds are not all over England, but that in these counties the perfection and quantities of each local breed are brought out. The Jerseys and Alderneys are very largely owned all over England, and, as in this country, are largely exhibited, more in number than the beef breeds are. In Scotland, the Polled Angus, Galloways, Ayrshire and West Highland are found at their homes, and the best of their kinds at the shows.

Still the pure bred cattle are not nearly as numerous as the cross-breds; everything is crossed, using pure bred sires, so as to give the best quality to the beef and mutton for the daily market. The prices obtained for pure bred animals are startling to a Canadian.

Sheep are very numerous in England and Scotland, in fact, it is where all good sheep come from. They have every breed under the sun, and they excel us very greatly in shepherding them. It is only necessary to see how trim and neat imported sheep look in comparison to our straggling wooled sheep, especially at the county shows.

Swine of all kinds are there also, each breed with its friends and new breeds just starting. They have also the finest of all breeds of poultry, selling for enormous prices. They have fine exhibits of wool of all kinds. Hops are in profusion also; England being a great beer country. They have competitions for horse shoeing. They show all kinds of pottery; sections of greenhouses with new designs for glazing also working dairies, in connection with which lectures on butter making are delivered. These are the more interesting, as all kinds of dairy utensils are on exhibition.

The immense seed establishments of England make large displays, spare no expense in advertising and put up buildings for themselves. The shows are early in the season, so there are no products of the farm, and no fine arts and ladies' work, and no expensive crystal palaces; consequently, each town or city is not so heavily taxed as with us, to erect immense buildings.

A show-yard in England looks like an immense military camp. The buildings are all covered with canvass instead of wood, as with us, and a great many tents are used, at Chelmsford, in the county of Essex; the fence around the show grounds was made of canvass, nailed on to posts in long lengths. Canvass must be as plentiful in England as wood is in this country, and what is more, there can be no duty on the goods to make them so cheap.

Another thing that impresses forcibly, is the system and order. On entering the grounds you will find boys selling catalogues of the entries, with every animal numbered, and its pedigree; and what is more, every animal will be found in the stall or pen indicated by its number, and all thoroughly classified. If there are twenty short-horned cows of one class, the twenty cows, all in a row, will be found in these buildings. Horses are found in the same way in stables that they can be seen in at any time by passing behind them.

Exhibitors in this country, as well as fair managers, have a great deal to learn. In England the entries are all made a month before the show, consequently, the catalogue is carefully prepared, and all animals numbered consecutively. Everything seems to move like clock work. The hours for judging each class, and the hours for the appearance of the prize cattle in the rings are all in the prize list or catalogues, and everything is done on the minute. In all their shows they commence judging the very first day, and give up the rest of the time to selling and parading their cattle in the ring. At one show I was at in Aberdeen, a one-day county show, the cattle being in the night before, they commenced judging at eight o'clock in the morning and had a parade in the afternoon.

The days seem to pass too quickly at an English show, although they do not have the horse trotting and amusements that we have. The most exciting thing they do is to have hurdle jumping, when the hunters have a chance to display their power of going across country, and as the riders are generally the owners of the horses, a great deal of interest is taken in it.

The displays of agricultural implements and machinery are usually very large. As there are a great many very large manufacturers they look very substantial. It looks odd to see a cart with two pairs of shafts, one beside the the other, for two horses. A great many of their machines are made from American and Canadian patterns, noticeably the reapers and mowers. But on account of the heavier crops of straw, and moister climate of the old country, they are more strongly constructed. As in this country the manufacturers of implements do business on a large scale, and are very energetic, pushing men. Shows are held in June, July and August, much earlier in the season than with us, as stock is the principal exhibit, and it is the proper time to sell to exporters. A great deal of business is done at each exhibition. Americans and Canadians are often there met hunting up something to rival their neighbors at their shows at home, and, I think, they would sometimes be afraid to mention the price they had paid for, say, a royal winner.

From the 7th to the 12th of June I stayed in London sight-seeing. I called on Sir Charles Tupper, at the Canadian offices. Did not find him at home, but was treated courteously by his assistants, and through his request was sent numerous cards of invitation, to see the public buildings in London. I called to see Mr. John Thornton, the English live-stock auctioneer; also Mr. E. Clark, secretary of the royal show, and E. J. Powell of the short-horned breeders' association. They were all very kind, and gave me a great deal of information. I visited the British and the South Kensington museums, the mint, the tower of London, the royal arsenal at Woolwich, the general post and telegraph offices, the houses of parliament, St. Paul's Cathedral and Westminster Abbey, replete with historical memories, and made my way through the never-ceasing crowds on the London streets, so wonderfully managed by a few policemen. The numerous means of locomotion by omnibusses, hansoms, underground railways—everything so substantial and good; the best pavements I ever saw, and the living so comfortable to those who can pay for it; then the old river Thames, the commercial shipping below the city, and the pleasure trips above the city, all of which must be seen to be appreciated.

On the 9th of June I visited a large horse show, held at the Royal Agricultural Hall at Islington—where John Gilpin took his celebrated ride. The show was for hunters, hacks and ponies, and was very successful, lasting six days, and where I had the pleasure of seeing the Prince and Princess of Wales with their two daughters. A good deal of leaping was done in the ring in the afternoon, There were in all 532 entries—consisting of 129 hunters, 190 hacks and ponies, 201 harness horses, and 12 stallions. The building is very large and well adapted for the purpose, seating comfortably, several thousand people.

On Thursday, the 12th, I visited the Essex county show, this year held in the town of Chelmsford, in that county. It was open to the United Kingdom, and the premiums were large. It was almost as well attended as the Bath and West, and was opened by the Prince of Wales. Sixteen thousand people paid for admission. The day I was there it rained incessantly, but was well attended; and as at Rochester and all old country shows, there was no special attractions inside, only a legitimate agricultural show. Inside the grounds they have a horse and cattle ring, with a grand stand, for which the charge was sixpence and a shilling; as in England different classes are distinguished, and they have to be accommodated according to class. Prize animals are paraded twice a day, and hurdle jumping frequently. The show of horses here far surpassed the one at Rochester. Essex is a famous horse breeding, as well as hunting county. A dog show and a horticultural show were amongst the extras to be seen at sixpence each. All the buildings were of wood, covered with canvass; and what was more curious, the ground was fenced in with canvass fastened to posts in long lengths, thus doing away with the necessity of large expenditures in the way of permanent buildings. When it is understood that these shows are held early in the season, and that no premiums are offered for the cereal products of the farm, and none for textile fabrics and ladies' work, it can easily be seen that the temporary buildings can be utilized, and after the show packed away, thus can be used again for the next year at some other town. The show of implements was very large, lots of reapers, mowers and wire rakes, built after the American pattern, but with somewhat heavier frame. There were also on exhibition many implements never seen in the country. It was amusing to see hay rakes of one man power, to rake hay in the fields along side of an old revolving wooden rake, and a much heavier steel horse rake than we use. Their waggons are very large and clumsy, some with two pair of shafts along side of each other. The traction engines were massive, also the threshing machines, driven by steam, quite different from ours, but, no doubt, as good. I was surprised at the number of manufacturers from all parts of England that exhibit at all the shows. There was a large show of pottery and of greenhouse and hot-bed varieties, which are rarely shown with us. Great interest is taken in flowers. The English people are extremely fond of them and they are to be seen everywhere. The show of dairy products was good. There was also a working dairy, in connection with which lectures on butter making was delivered; and a large apiary show, where a professor lectured on bees almost continuously. The show of live stock was good, there being a particularly fine display of horses, Shorthorns, Guernsey and Jersey cattle were well represented. As I said before about other shows, each locality has its favourite breeds of cattle, horses and sheep. Essex county lying next to the county of Suffolk naturally brings the Suffolk punch horse and Suffolk sheep to the front, and Suffolk horses were honored by being first put on the catalogue. There were 31 entries of stallions, and 21 of mares. They were a splendid lot, and if not equal to heavy draught horses for cart horses, would surpass them for ordinary farming purposes. Shires came next on the list. There were 33 males and 69 females, a very fair lot, and many of them with fine bone and action; the fillies were very good and serviceable. There were six thoroughbred stallions of a very powerful kind, calculated to breed hunters. I now come to a class novel to Canadians, who drive so much. A class of hunters five years old and upwards, up to carrying 14 stone or 196 lbs, and which had regularly hunted during the last season in Essex. There were 31 entries of those, and a splendid lot they were. We have very few such horses in this country: and the prices were immense, from 200 to 500 guineas. There was also a class for tenant farmers, horses to carry 13 stone or 182 lbs. There were 15 entries of these. There were 111 more entries of hunters, geldings and brood mares, of a lighter stamp. Prizes were given for the best appointed turnout, which brought to the front something we never see at home, of any account. The four-in-hand drags and tandoms of the country gentlemen, and revealed the wealth of that class in England.

In short horns, Messrs. R. Thompson of Inglewood, Penrith, Cumberland; Charles William Brierly, Rosedale, Tenbury, Worcestershire; J. Deane Willis, Bapton Manor, Codford, Wiltshire; J. J. Sharpe, Broughton, Kettering; and H. R. H. the Prince of Wales, Sandringham, were the principal exhibitors. There were 68 entries, and they made a grand display in the "marching past." There were a few red Polls of good quality on the ground; there was an immense show of Jerseys, 139 enteries, with many very fine animals. The Prince of Wales, Lord Brooke (the President of the show), Lord Rothschild, Lord Raybrooke, and Mr. Charles M. Wade, were among the principal exhibitors. Of Guernseys there were only a few, but of good quality.

The show of sheep was excellent, the Southdowns being the first on a list on which there were 47 entries. The Prince of Wales had a very fine lot from Sandringham, and Mr. J. J. Colman, M.P. of Norwich, were among the exibitors. Of suffolks there were 28 entries: This is a class of sheep that I had never seen before, but it is now well established. By the kindness of Mr. E. Prentice, the Hon.-Secretary of the Suffolk sheep society, I was presented with the 4th vol. of the Suffolk Sheep Societies Flock Book, which gives an idea of the importance of this breed of sheep. I am sure they are well suited for Canada; they are a large, compact, black-faced sheep, resembling the Southdown in character, and wool, but about 10 per cent. larger, and proportionately longer in the leg. I give a brief description of this breed, taken from the preface to the 4th vol. as given by the Secretary:—"Suffolk sheep were originally produced by crossing Southdown rams on the original horned Norfolk ewe. These sheep are noted in 1797 in Young's view of Agriculture of the county of Suffolk. The mingling of the form and fattening properties of the Southdown, with the hardy, pure blooded, and highly bred Norfolk, resulted in a valuable type of animal, the Norfolks giving the characteristic black-faces and legs. The horns were eliminated by selection in the course of a few years. In 1859 these Southdown-Norfolks were christened 'Suffolks,' classes being given them at the Suffolk argicultural association meeting."

In 1886 the Suffolk sheep society was established, and commenced the present record, and has adopted a scale of points.

Of Hampshire-downs, there were a few shown, those of Mr. Henry Lambert of Babraham, Cambridgeshire, came to the front. Oxfordshire and Shropshire downs were exhibited together, thus showing that we were in the wrong part of England for these breeds.

The show of pigs was not large. Mr. Sanders Spencer of Hollywell Manor, St. Ives, Huntingdonshire, being the largest exhibitor of Yorkshires and Berkshires; Messrs. Sturgeon & Son, Romford, and W. John Innes, Morden Hall, Surrey, were the principal prize-takers.

I was well treated by the officials, and lunched with the mayor of the town, the secretary Mr. F. Whitmore, and the president Lord Brooke.

Chelmsford, the county town of Essex, is thirty miles from London, and contains 10,000 inhabitants. The ride there from London is interesting, as several fine towns are passed, and on leaving Essex, the farms are very good. I did not see any very good yielding fields of hay, and it was all wet. The meadows are literally yellow with buttercups, which the cattle do not seem to care for when green, although they eat them cured with the hay.

The next two or three days were spent in London, visiting the Kew Gardens, the Zoological Gardens, going to the curious old Temple church and on Monday, the 16th of July, I started with my nephew, and armed with a letter of introduction to Mr. Tate of the Queen's Shaw farm at Windsor, found him busy preparing for the royal show to be held at Plymouth. We were shown the short-horn cattle. The females were roaming about on part of the great Windsor Park, of which this farm is a portion.

The short-horns owned by Her Majesty are a very good lot. The bull, "New Year's Gift," 57,796, now used at the head of the herd, and which took the 1st prize at the Royal a few days afterwards, is a splendid animal, and was bred by Lord Lovat, Beaufort Castle, Inverness-shire, Scotland, and was sired by "Bannockburn," 49,035. We were shown three more very fine yearlings, two of them, "Napoleon" and "Stanley" sired by "Field Marshall" 47,870, another celebrated sire, now dead, but for some time at the head of the Queen's herd. The other fellow "Paymaster," was got by "Norseman" 56,233, and out of a "Field Marshall" cow. They were roans. "Napolean" was out of a Cruikshank Nonpareil cow by "Cumberland" (46,144.) I see he was commended at Plymouth. The females of this herd are of various families, the Cawlinas have been bred by the Queen for some time, the Molly Linds by Mr. J. Bruce of Burnside, Fochabers, Scotland; the Ruths by W. Tretheny, Tregoose, Cornwall; the Camillas by S. Campbell, Kinellar, Scotland; the Daisy Gems by W. Duthie Collyne, Aberdeen; the Fawsleys came from the herd F. Leney & Sons, Wateringbury, Bates' Cattle; the Claras from W. S. Marr, Upper Mill, Aberdeen, Scotland; the Lally Booths from P. H. Rowlandson, Kirkby Stephen, Westmoreland; the Strawberry Leafs from the herd of Hugh Aylmer, West Dereham Abbey; pure Booths, Princess Josephine from the herd of Lord Polworth, St. Boswells, Scotland; the Broadhooks and Beauforte Roses from the herd of Lord Lovat of Inverness. A two year old heifer "Empress" by "Field Marshall" 47,870, out of "Eugenie" by "Prince Albert Victor" 40,479, was highly commended at Plymouth, and a yearling "Rosalind" by "Field Marshall" 47,870, out of "Ruth" 201st ,by "Star of Britain" (48,786,) took the first at Plymouth. Evidently Mr. Tate, the manager of this beautiful farm is not a stickler for any one strain of short-horns, but thinks out of the many strains he will be successful with some, as he has been already. After inspecting the short-horns, Mr. Tate kindly sent a man with us to show us the dairy cows and the royal dairy; this latter was furnished most beautifully with tiles and marble, portraits of all the Royal Family, cream pans of beautiful and rare china, and to finish up with, a broad Scotch dairymaid in charge. From there we took a short cut to the old city of Windsor, through a part of the park that is not open to the public. It is all Windsor Park for miles around. The King's Walk, a part of which we drove through on our way to the farm, is eight miles long with two rows of oak trees on either side, planted about the time of the Georges. On our walk we passed Frogmore Palace, and had a glimpse of the mausoleum in which Prince Albert is buried. We also passed quite closely to a little summer-house where Her Majesty has often breakfasted. After lunch at Windsor, in a quaint little inn on beefsteak, washed down with Devonshire cider, we proceeded to see the rest of the sights in the royal old town. First we explored St. George's and the Memorial Chapel to Prince Albert. The latter is modern inside, and perfectly beautiful, the other is very ancient, and is the burial place of many kings and queens of England. Before entering the palace we climbed up innumerable stone steps to the top of a tower, and were well repaid by the sight of one of the most beautiful pieces of country that I had ever seen, lovely parks, beautiful trees, magnificent residences and palaces, Eton College, and the town of Windsor. After that we were ushered through Windsor Palace, a number of people at a time, as at that time Her Majesty was at Balmoral. The royal residence is very beautiful, grand and historical, but uneasily often lies the head that wears a crown, so much form and ceremony is required, that I think a quiet home in Toronto will do me just as well.

The next day, Tuesday, the 17th of June, I went to Malvern to see the Herefordshire county show, but strange to say, Malvern is not in Herefordshire but in Worcestershire, an adjoining county. The journey from London is very pleasant by the Midland, by way of Worcester. Malvern is an inland health-resort, famous for its bracing air and pleasant situation. It has a beautiful Priory Church, belonging to a priory built in the eleventh century, and of perpendicular and Norman architecture. The town is built on the side of the

Malvern Hills, of which Worcester Beacon is the highest (1,444 feet high), from which is a splendid view, and from which Hereford, Worcester, Gloucester, Cheltenham, and Tewkesbury can be seen clearly. It was in olden times used to fire a beacon light upon, and was made use of for the same purpose on the jubilee year of Queen Victoria.

> **"Twelve fair counties saw the blaize,**
> **From Malvern's lonely light."**

The principal feature of this show was the magnificent exhibit of white-faced Hereford cattle. There were nearly 100 entries of this class alone, this being the local breed, and a splendid lot they were, all in good order. The most prominent specimens of the breed were present, including those which have already made their mark at the Bath and West of England show at Rochester a few days ago. Lord Coventry of Croome Court, Severn Stoke, Worcestershire; James Rankin, M.P., Bryngwyn, Herefordshire; and a great many more noted Hereford breeders were the principal prize winners. Their animals made a famous show in the procession. Short-horns were good but not numerous. Mr. Charles Wm. Brierly of Rosedale, Tenbury, Worcestershire, was the principal exhibitor, with the herd he had already shown in Rochester and Chelmsford. Mr. T. E. Walker of Studley Castle, Warwickshire, was quite a a prize winner. There was a large display of Jerseys, greater in fact than any class but the Herefords. There was a fine exhibit of horses, shires taking the lead, then thorough-breds, hacks, and hunters. They made a good display, and the hurdle jumping was good. Of sheep, the Shropshire Downs took the lead in numbers, and were of very good quality. Next came the Cotswolds, a very good exhibit, and a favourite sheep in Herefordshire. Strange to say, there were no swine; they were prevented from showing by the prevalence of some fever. Prizes were given to Cider and Perry, also for wool. The working dairy was on hand, with lectures every day by Miss E. A. Maidment, from the Royal Agricultural Society. There was a large display of agricultural implements of all kinds, and in one shed I came across an exhibit by the Massey manufacturing company, of Toronto; their agents who were Toronto men, informed me that they made a great many sales. My thanks are given to Mr. Alfred Edwards of Leominster, the courteous and obliging secretary.

On Wednesday, 18th June, I took an early train for London, by way of Gloucester, in order to see a fresh country, stayed a few hours in that old city, and went to see their famous cathedral, Holy Trinity, built in the 11th century, and on the site of an old monastery, built A.D. 820. The interior is curious, the cloisters are large, and were used in olden times by the citizens to take exercise in, when they were driven to take protection in the cathedral by invading forces. Edward II. is buried here, and many pilgrims used to visit his shrine, and left plenty of cash, which was used up in the building fund. Robert, Duke of Normandy, eldest son of William the Conqueror, is also buried here. It made one feel very young, marching about amongst so many relics of the past. After lunch, at which I had some double Gloucester cheese, I started again for London, by way of Swindon, passing some of the most beautiful scenery I ever saw in the Stroud valley; such trees, fields, hills and valleys it is seldom one's privilege to see. From Swindon we ran to London very rapidly.

On Friday, 20th June, I started early to go to Norfolk to inspect the herd of Hugh Aylmer, Esq., West Dereham Abbey.

It takes a little over three hours on the Great Eastern railway to reach the splendid farm of 1,500 acres owned by this gentleman in the county of Norfolk.

This part of Norfolk is known as the "Fen" country, as it is very flat, and at one time must have been very wet. It is now well drained by large ditches, from which the water is pumped to a higher level by old fashioned windmills, resembling very much the one charged on by "Don Quixote." I thought at first they were for grinding grain, but found out on enquiry they were for draining purposes. They add not a little to the picturesqueness of this very rich country. Mr. Aylmer's residence is close by the ruins of an abbey, of which a part of the walls, some of the moat and an old road to reach the grounds of the abbey are plainly to be seen. The old monks certainly had an eye for good land. as it is one of the richest and best cultivated farms I ever saw,—not park land, but rich, arable soil fit for any crop, with the grass in each pasture field affording a view never to be forgotten. The estate is divided up into several farms, each under the care of a foreman, but is all farmed by the active and energetic Mr. Hugh Aylmer, so well known to live stock circles in England and Scotland. I was met at the station and driven to the residence of Mr. Aylmer, a fine old English house, with beautiful grounds, well kept hedges, a greenhouse with geraniums and fuchsias twelve or fourteen feet high, trained up against the walls, and the general appearance of wealth, comfort and good cheer, only to be seen in its completeness in old England. To a Canadian the want of large barns, such as we have in this country to hold the grain seems strange, and the buildings for holding the cattle are all so low, still they are substantial, and in a great many instances they have been built for hundreds of years. The old ones are covered with red tiles, the later ones with slate, and now corrugated iron, and the studdings paved with cobble and other stones.

After lunch Mr. Aylmer and his secretary took me out to see the cattle. He owns about 160 head of Shorthorns, 800 head of Cotswold sheep and several Berkshire pigs. These are divided up on the several farms, so it necessitated being driven from one farm to the other. The Shorthorn females are all out on the pastures, about twenty in a field, and I say, without hesitation, that in all my life I never saw such a fine group of grand, lengthy, blocky, and exceedingly uniform animals—no small or stunted looking ones, but all built on a generous pattern, the roan color predominating; some reds and a few white ones, this being of no detriment in England. They had just as fine points and lines as the best Aberdeen Shorthorns, and were on a much larger pattern and rank highly as milkers, nursing as they do their own calves and living on their own pastures, both in summer and winter. Mr. Aylmer's Shorthorns are of a thoroughly Booth character, the best bulls procurable from Warlaby having been selected for the last twenty-five years from that herd. These, together with the herd bulls bred on the farm, have been used. Also Mr. Aylmer has, from time to time, purchased the finest Booth cows, when first class herds have been sold. The herd consists of eight tribes: the Bliss and Fames from Warlaby, the Chalks from Killerby, the Ribys trom Mr. Booth's Anna, the Flowers and Goldens from Aylesby, the Maids from Yorkshire, and the Angus Strawberries from Storrs in Northumberland. As far as possible Mr. Aylmer keeps the different tribes of cows in pastures by themselves, and it is a treat to see them,—such frames and such beefing and milking qualities, with not a bad one in the lot, and how he manages to keep them out is his own secret, which no one can unravel.

After seeing the cows I was shown the bulls and heifers; I then found out the reason why so few are brought to Canada,—It is the high prices that Mr. Aylmer gets for them. Can you imagine a Canadian farmer paying 200 guineas, or over $1,000 for a roan two-year-old, the sum paid for Knight ot Dereham (57545), out of Killerby Queen 7th, one of the Chalk family. Mr. Aylmer had ten 1889 yearling bulls by Royal Fame left out of a lot of twenty or thirty raised.

They sell from 100 up to 400 guineas, or from £400 to £1,600. He sometimes sells a younger calf for 60 guineas, or $300. Heifers sell also for large prices. To give a few examples of prices obtained from the different families, three bulls and two heifers out of Bijou, by Sir Wilfrid (37484) a Bliss cow, were sold for $1,150. From Castanet 6th, by Sir Wilfrid (37484), a Fame cow, three young bulls were sold for £400, and a yearling heifer for £105. Castanet 4th, by High Sheriff (26392), another Fame cow, is the dam of four bulls that sold for £914 10s., and also is the dam of Royal Fame (52035), a celebrated sire let to Her Majesty for the Prince Consort's Shaw farm, has also been used at Warlaby, and by Mr. Aylmer; twelve bulls used by him have been sold at an average of £175 each. The Castanet cows make a fine show. The Chalk tribe have a diversity of names, such as Clematis, Clementina, Cyclamen, Crocus, Clove, Crysanthemum, Canarienses, and other spicy and flowery names, nearly all commencing with a C., a very good plan where the family names are followed up. Four bulls from Christina sold for 525 guineas; three bulls from Cheerful for £472 10s.; five bulls from Cinderella for £682 10s. The Killerbys also spring from the Chalk family, the bulls from the Killerbys also selling for £105 a piece. Mr. Aylmer has several Ribys from the Booth Anna tribe from Studley. Of the Flower tribe Foreign Beauty by Knight of the Shire (26552), first bull calf at seven years of age, was sold for 350 guineas after earning £559. Besides, the Golden tribe from Aylesby have also made their market. The Maid tribe, from Maid of Orleans, by Knight of Windove (16349), also have established a record, two bulls from Marchioness of Lorne by Sir Wilfrid having sold for £577 10s. The Strawberry Bloom tribe are also fine animals; in fact, as I said before, I never saw such an even and good lot of Shorthorns in my life.

Mr. Aylmer also has a flock of about 800 Cotswold sheep of large frame, heavy fleeces and grand appearance. Mr. Aylmer does not exhibit now at any of the shows, but when showing some years ago he was always a large prize taker. He has a sale and letting of rams on his farm each year, which is largely attended. This year, July 24th, he sold eighty shearling rams and eighty ram lambs and shearlings averaging $54.50 each, and the lambs $43.35. Mr. Aylmer also keeps a very fine lot of Berkshire swine, also kept in good order.

The afternoon passed away much too quickly in viewing the stock. After a fine six o'clock tea, with lovely English strawberries as plump as the cattle, I had to say good-bye to my courteous host and hostess and take train for London, only wishing I could have accepted the invitation and stayed until next day, but as I had to leave next morning for Plymouth this could not be done.

On Saturday, the 21st, my nephew and myself started for Plymouth, to attend the Royal Show. We went by the Great Western, via. Bath, Bristol and Exeter, and at the rate of fifty miles an hour, through a beautiful country; it made one's eyes ache watching it. From Bristol to Exeter the train passes through a flat country, affording glimpses of the Bristol channel at Werton-Super-Mare, and Highbridge, then across country to Taunton in Somersetshire, then on to Exeter, the capital of Devonshire, with nearly 50,000 inhabitants, and like all old cities in England, the possessor of a grand old cathedral. The road from Exeter to Plymouth traverses a most varied and picturesque district and unfolds a constant panorama of changing views. We ran to Dawlish, alongside the river Exe, then past Teignmouth, to Newton Abbott, alongside of the English channel, from here to Plymouth, again across country, arriving at our destination at 3.40 p.m. Plymouth and its sister towns of Devenport and Stonehouse, the

Three Towns, as it is commonly called, with a joint population of 170,000 souls, form one of the chief ports in the Kingdom, and is in the front rank of government arsenals. The three towns are delightfully situated on the rivers Tamar and Plym. The Hoe is the well known marine parade of Plymouth, and from it a magnificent view can be obtained of the Sound, Breakwater, Drake's Island, Mount Edgcombe and surrounding scenery. We did not stay in Plymouth longer than was sufficient to secure lodgings for the week of the Royal. We then went on to Leskeard, in Cornwall, and on Sunday drove eight miles to North Hill, a village close by the farm on which my mother was born. I spent the day on the farm, visiting my mother's people, and saw the *stocks* in the old *parish* church where, no doubt, some of my mother's progenitors had been incarcerated in days gone by. Cornwall is a very interesting old county and the drives amongst the varied scenery on good old roads are very enjoyable. The climate is exceedingly mild; myrtle and hardy kinds of palms thrive in the open air. The average temperature in summer is 50° and in winter 60° Fahrenheit. The great economical importance of Cornwall arose in old times from its rich mines of copper, tin, lead and silver; but only a few of the tin ores are worked now. The hedges in the valleys are very old and full of beautiful flowers, but there is much barren moor land on the hills that cannot be cultivated. The drive through the winding gravel roads and old hedges filled with foxgloves, violets and ferns, was exceedingly pleasant. The roads were hilly and we passed many deserted copper mines and climbed up the steep roads to the top of the Cheesewring, a very curious old place, with rocks piled up on top of one another 30 feet high, and looking as if they had been put there by the hands of giants in ancient days. We had a striking view of the surrounding country, which looked like a large landscape garden. The fields are very small and green, the hedges run in every direction, nothing uniform, and on the top of every hill are deserted mines.

Monday morning, the 23rd of June, found us in Plymouth and at the show, the best managed agricultural show in the world, everything is in order and moves like clockwork, no expense being spared by the management. Gate receipts are but a secondary consideration and comfort an essential. There were three large buildings with dining room attached, substantially built, one for the directors, a great many of whom are titled gentlemen, one for the stewards or managers of the show, and another for the judges. The weather for the entire week was perfect, a bright sun and comfortable, warm weather. Here as at other shows the locality brought out exhibits and visitors entirely indigenous to the neighbourhood It was pleasant to talk to farmers who had been occupying land for fifty years, who had never bought a head of live stock except from some neighbouring farm, who have tilled their land in each spring after no more elaborate rule than in order to gain the most of what their stock suggested that they themselves would want in the next year. Their local cattle are the North Devons, cattle that can always walk no matter how fat they are. North Devons are also well known in other parts of England and America; but the South Devon or Ham cattle are a breed not known out of their own neighbourhood, and the South Devon farmer wants no better. Somebody has said that the cow for the future is to be one which spends two-thirds of her life in butter making and the other third between coming into profit in the dairy and fitting herself for the butcher. We believe that the South Hams cattle have been doing that. Milkier mothers we never saw. No carcasses more easily to be covered with beef. I got the information from good authority. They are a long legged, heavy framed, red cattle, but well adapted to the country in which they are bred. The local farmers also swear by the white faced lambs, from the ewes that by an old-fashioned custom are shorn at midsummer. They are Devon long wools, the rams of which sometimes shear 20 lbs. of wool and the fat sheep average 80 lbs. the carcass. South Devon or Hams are another local breed. The type of these sheep may be described as showing a top knot of wool, not too heavy, a brownish face with broad dark muzzle. Black swine is another native of Devonshire. If one is not satisfied with such choice meats as these look at the ancient race of Devonshire and the Cornish people. See what they use every day on their tables at home,—clouted cream with strawberries or with deep apple pie, gooseberry pie and cider. Who would not be a west or south country man?

The show in the light horse classes was not very large and was divided into hunters, of which there were 68 entries; coach horses, 18 entries, hackneys, 31 entries; ponies—Dartmoor ponies and Exmoor ponies, 51 entries. In heavy horses the shires come next with 41 entries of very good horses from different parts of England. Clydesdales, 35 entries, and nearly all from Scotland and the north of England, and of good quality. Suffolks come next, with 55 entries, and a fine lot they were, then agricultural horses, with 10 entries, only showing that in England they do not run to all kinds of cross bred horses.

Among the cattle, Shorthorns were first on the list, and a splendid lot they were, 66 entries. In aged bulls "Challenge Cup," 57029, bred by Wm. Duthie, Aberdeen, and owned by J. D. Willis, of Codford, Wiltshire, took first prize. The rest were a good lot, in two year olds. "New Year's Gift," (57796,) owned by Her Majesty the Queen, took first. He was bred by Lord Lovat, Inverness, Scotland; the rest were very good. In bull calves, "Count Lavender," bred by J. D. Willis, took first; there were 17 in the ring. In the class of cows calved before 1887 "Molly Millicent," the Royal winner of last year, again carried away the honors as first in her class, and champion. This is, without exception, the finest Shorthorn cow I ever saw, with her beautiful head, finely developed fore quarters, grand square frame, under which is a wonderfully well shaped udder; fit to win in any dairy class, and with all is a characteristic Shorthorn, owned by R. Thompson, Inglewood, Penrith, Cumberland. This gentleman had a very fine herd there and was quite successful. I am very sorry that I was not able to accept his kind invitation to visit his herd at their home. C. W. Brierly, of Tenbury, Worcester, was also a large exhibitor. The whole display was very choice. Of Herefords there were 65 entries, and a grand lot of Devons and South Hams; of these were 87 entries and a very choice lot. I wish our friends Rudd, of Guelph, and Harper, of Cobourg, would venture to recruit their herds with some of the bulls I saw there. Of Sussex, there were 24 entries of beauties a shade larger than Devons. Of Welsh cattle there were only 4 entries of bulls; Red Polled, 24 entries of very good quality; Jerseys, 168 entries of these pets of the ladies, and of very good quality; Guernseys, 80 entries, a good lot; then came an entirely new breed, the Kerries, nearly all direct from Ireland; 95 entries of cattle about 4 feet 6 inches high, they are celebrated for being good milkers. Sheep came next with 40 entries of Leicesters; they were a good lot; Cotswolds, 27 entries. Russell Swanwick, from the Royal Agricultural College Farm, Cirencester, was the largest contributor. Lincolns, 29 entries, a good lot; Oxfordshire Down, 24 entries of good sizes; Shropshire Down, 180 entries of these grand sheep, so beautifully shown and well clipped and coloured. A great many were sold to come to America, and as much as 40 guineas was paid for first prize shearling lambs for Detroit. Of South Downs 74 entries were made and there was a very fine display, the Prince of Wales being a large exhibitors. Of Hampshire Downs there were 35 entries; Suffolks, 28 entries; DorsetHorned, 17 entries, Devon-long-wool, 42 entries; South Downs, 26 entries; Dartmoor 33 entries, and Exmoors, 12 entries.

Swine.—There was a large and very good show. Of large whites there were 51 entries, of middle whites, 26 entries, and small whites 14. The improved Yorkshires are shown with the large whites. Of Berkshires there were 44 entries, and a grand lot from the best breeders under the heading of any other black breed ; there were 29 entries. A lot of them were Essex pigs, and a finer lot of even swine of that breed, shown by W. S. Northey, of Finlay, Litton, Devonshire, I never saw. My attention was called to them by Mr. James Main, of Boyne, in Ontario. Tamworths, 52 entries, are the ugliest breed of pigs I ever saw, with great, long noses and rough looking bodies. They will never take in Canada. Of poultry there was a magnificent display, 690 entries. The display of machinery was most complete, quite a little city of sheds, with street after street. I found the "Massey manufacturing company" on hand here as well as at other shows. There was quite a collection of bees,hive honey and apiary supplies ; a competition for butter makers ; a working dairy, and a horse shoeing competition, also a farm prize competition the same as we have here, the entries being made this year in the neighborhood of Plymouth. I met John Campbell, jr., of Woodville, Mr. Chapman, of Ormsby, and Chapman, Springfield-on-Credit, and Mr. James Main, of Boyne, all looking for stock. Mr. Main seems to be the right man in the right place, as he knows everybody, and the prices they have to pay is startling

On Thursday, the 26th, I attended a sale of Shorthorn cattle at Tortworth Court, in Gloucestershire. I stayed at Bristol the night before, and took train from there to Charfield, two and a half miles from the court, where we were met by carriages and taken to the sale at Tortworth Court, built by the late Earl Ducie, Lord Moreton's grandfather. We drove through miles of park, with splendid trees, one chestnut girthing 50 feet in circumference. The sale was conducted in a ring in the open air, the celebrated John Thornton being the auctioneer. He uses a sand glass, and is well versed in his business. A large lunch was first given in an immense tent, where a great deal of good cheer was relished by a fine lot of English gentlemen and farmers, Lord Moreton himself presiding. His herd was established in 1875, and is of the Bates and Duchess strain. The first purchases were from Kingscote, later strains from Sidington, Ashdown, Wateringbury, Sandringham, Lathom, Osberton, Manoravan, and the Duffryn. The Sidingtons and Kirklevingtons were numerously represented, as well as the Worcesters and Wild Eyes, the Waterloos, Acombs and Barringtons. A great many celebrated Oxford bulls have been used. The cows were of large frame, and good milkers. About 60 Short Horns were sold, averaging about 40 guineas each. The highest price was 100 guineas, for Duke of Vittoria, 13th, a Waterloo bull by Duke of Barrington, 15th, 52745. Another bull, Duke of Leicester, 11th, 57209, sold for 100 guineas ; he was a pure Duchess, by Duke of Barrington, 15th, 52745. This was a very pleasing day to see such a representative sale conducted by Mr. Thornton.

The next week I spent in Paris, a lovely city ; but my visit there being for sight-seeing only, I shall not describe it.

On Monday, the 7th of August, I found myself visiting friends in the city of Ipswich, county of Suffolk. It is a fine old town of 51,000 inhabitants, and is on the estuary of the Orwell, being visited by large vessels. I also visited a curious old house, with a quaint chapel roof in one wing. In this house King Charles was hid after one of his battles. I visited the agricultural works of Ransomes, Sims & Jeffries, one of the largest in England, for the manufacturing of steam engines, steam threshing machines, plows and field implements of all kinds. This factory was established in 1789. It is known as the Orwell Works, and covers more than twelve acres of land, employing upwards of 1,400 men and boys. Portable steam engines and threshing machines are a specialty with them, and every improvement has been added to make them as near perfection as possible. A great many are shipped to foreign countries. The manufacturing of plows has, for over 100 years, been made a specialty, and in 1803 Mr. Robert Ransome invented the greatest of all improvements in the plow, viz., "The patent cast chilled self-sharpening plowshare," which is now universally used. The patterns of plows made by them are numbered by thousands. They now use the chilled mould board as well. I was much pleased with the system and order maintained in their premises.

On Tuesday, the 8th of July, I visited the Royal Counties Show at Winchester, in the county of Hampshire, a city of great antiquity and of about 20,000 inhabitants. It possesses a grand old cathedral, built in 1079; also fine schools for boys—a part of one college being a very ancient castle. The country around is beautiful, and the climate in winter very mild. The show was pleasantly situated, but the weather was anything but favourable; incessant rain is not condusive to a successful show. Here we have again an agricultural society carefully developing the varieties of stock that are raised in its immediate neighbourhood. Winchester gave the place of honour in its prize list to sheep, commencing with its own local breed of Hampshire Downs, of which there were 122 entries; South Downs next, with 77 entries. There were only 11 Oxford Down sheep and 13 Shropshires, with 12 Long Wools. The show of horses was not large—72 agricultural horses, as they call them, no classes for heavy draught. The exhibit of Clydes and Shires together prove that in this respect they are behind the times. Of hunters, drivers and ponies there were only 45 entries. Of cattle the Short Horns took the lead. Her Majesty made an exhibit in this class, and New Year's Gift again got first for bulls, while Challenge Cup, owned by J. D. Willis, came second. Sussex cattle turned out well, while Devons and Herefords were not numerous. Jerseys made a great display—no less than 263 entries all alike. Guernseys, 136 entries, and a creditable lot. There were a few Kerrys as well. There was a very good show of pigs, Berkshires predominating. A little hurdle racing and jumping was done between the showers. I was accompanied by an artist friend, whom I found a good judge of cattle. The artistic eye saw symmetry and points. I saw an unusual sight for a Canadian: the mayor and city council with gowns and wigs, preceded by an usher carrying the mace. It looked rather comical in the rain. This feature would have made an attraction for friend Hill, of the Industrial. After this show I spent a few days more in London; then, on the 9th of July, I started north to visit relatives of my father in Sunderland, in the county of Durham, made several little excursions from there to neighbouring places—one to the city of Durham, to explore the wonderful old cathedral in that place. I had stopped over at York on my way up to see the minster or cathedral there. One day my cousin and I went out to Seaham Harbour by train, to visit the Clydesdale stud of the Marquis of Londonderry. By the kindness of Mr. Brydon, the manager of the estates in that neighbourhood, we had a good view of them. Here, again, a Canadian is astonished to find that everything is owned by the Marquis; the town, the harbour—or rather wharf—and even the railroad from Sunderland, are all owned by him; his coronet is on every car. The mines belong to him; he also owns an island or two in Shetland, and raises ponies by the hundreds, sending many of them to Seaham to work in the mines. The town of Seaham Harbour is sixty years old, and now has a population of 10,000 souls. Three hundred vessels can lie in its spacious docks and havens and load coal, which is the principal business of every one in the neighbourhood. The Marquis also lives here a great part of the year at Seaham Hall. His famous stud of Clydesdales was founded on a small scale in 1877 by the purchase of a few high class selected mares, chiefly of Keir, Merryton and Blackhall blood. These having been carefully mated and bred from, and additional mares purchased as opportunity offered, the stud has increased to its present proportion—about 150 head. The predominating blood is that of Prince of Wales (673), Time o' Day (875), and Darnley (222), almost every female in the stud having blood of one of these horses in her veins, and in several cases of all three. In 1881 a spring sale was established, and has continued annually ever since. The annual draft sold has averaged thirty-four animals, the lowest average price being $270, and the highest $516—which price was obtained this year; thus showing that the stud has been gradually, under the management of Mr. Brydon, gaining in public estimation. These averages refer to the public sales only. A great many are sold by private contract at probably better prices. Messrs. Ormsby & Chapman, of Springfield-on-the-Credit, brought over two stallions from there this year. The stud has also been very successful in the show yards. The principal stallion in the stud at present is Castlereagh, a wonderful prize-winner.

The next day I spent at Newcastle-on-Tyne, a wonderful shipping and manufacturing place of 150,000 inhabitants, noted for shipping coal and steamer building, as also for its locomotives. It is the natal place of George Stephenson, and the first locomotive built by him is on exhibition there. There is a beautiful park, through a prettily-wooded little glen, presented to the city by Sir William Armstrong, of big gun celebrity.

On Monday, the 14th of July, I started to visit the birthplace of my father, at Great Aytoun in Yorkshire, accompanied by my cousin. We passed through Stockton-on-Tees and Middlesboro', both celebrated iron and coal cities. Aytoun, or, as Yorkshire men say, "Cannie Yatton," is at the foot of Roseberry Topping, the highest hill in all Yorkshire, and is celebrated as being the birthplace of Captain Cook. I found an old man of about 80 years who remembered the Wades, although it was 72 years ago that our family had left there. The little town is very ancient and as primitive as it was 70 years age. The farming country in the valleys is very good, and, as no mines are worked near the town, it retains all its primitive simplicity; has a village green, a duck-pond and an old church dating back to 1666, not used, as a new parish one is built there. The farm is called Airyholme, and, from all appearances, has not changed in the least since our people left; a brick house covered with tiles, and stables old as the hills. My recollections carried me back to many a tale told me by my father of Cannie Yatton and Newton village. One can do a great deal in a day in England, as it is not dark until between nine and ten o'clock at night, so I found time to take rail the same day to Northallerton, in Yorkshire, a quiet English town, celebrated as being the nearest town to Warlaby, the home of the Booths and Booth Short Horn cattle, established 100 years ago by Mr. Thos. Booth, of Killerby and Warlaby. He commenced with the Colling blood. To Mr. T. Booth's sagacity, followed by the consummate judgment of his two sons, John Booth, of Killerby, and Richard Booth, of Warlaby and Studley, and to the persistence of his grandsons, also good judges, in the system commenced by himself, we must ascribe the successes of the Booth family in not only maintaining, but also, as far as improvement could go, improving the characteristics of the descendants of the herd which was founded in 1790. We therefore see, to this day, at Warlaby, a herd with a history a century old in the hands of its founder's family, and bearing the characteristics stamped upon the animals by that founder, by his sons and grandsons. The stock is under the management of Mr. Wm. C. Booth, of Oran Catterick, trustee to the estate. Unfortunately I had not time to arrange with him to meet me there, as he very kindly offered to do when I met him at the Royal Show. Mr. Grainger, the herdsman, showed me the stock.

The first thing noticed was the luxuriant growth of the grass in the pastures, and the goodness of the grass was shown in the splendid condition of the cows and heifers which were getting nothing but this grass feed. I found about 80 head of Short Horns descended from old Royal Maiden, the dam of twelve calves. Down in another field I saw a nice lot of yearlings and two-year-olds, all in good order and a grand lot. The bulls were in the houses in loose stalls. King David, eight years old, a lengthy bull with an excellent coat of hair and standing up well; St. Patrick, a three-year-old by King Hal; a two-year-old, Gay Harbinger, promises well (by Royal Riby, out of Mr. T. H. Hutchinson's prize cow, Glad Tidings); also several bull calves of good quality. This visit was a great treat to me, as a student of Short Horn history, as Warlaby is a herd-book word often repeated. From Northallerton I went on to Darlington, a great market town for live stock, and stayed all night. The next day I proceeded to Gainsford, in the county of Durham, and remained a few days with relatives on my father's side, who are large tenant farmers under the Duke of Cleveland. Hilton Hall, the farmhouse, was fully 200 years old, and as good as ever. It had lately been renovated by the landlord, as had also the fences and ditches. I came to the conclusion that tenant farmers under such landlords as the Duke of Cleveland were almost better off than those who own their own farms in this country, although they pay a good rent. The work can be done on the farm so much cheaper. Women hoe turnips and work in the hay fields for eighteen pence a day, while the hands work for a very moderate wage and are very trustworthy. In walking over the farm in the morning we passed a piece of scrub with bushes where the game was protected—rabbits, partridges and wood pigeons. The adjoining farm, called "Morton Tynemouth," was a great curiosity to me, as two of the heifers imported by my uncle in 1845 were purchased and raised at that place. We also drove to a son-in-law of my host's, who has 500 acres under the same Duke. He grazes very largely, and is always buying and selling cattle and sheep—in fact, this is the chief business of all the farmers in this neighbourhood. While I was there the chief subject of conversation was how to get enough store cattle to feed. Mr. Dods wanted 100, then my host 50, and all the neighbours were clamouring for them. At the home markets they were paying £17 for them, while beef was only bringing, on an average, £20, I told them store cattle could be brought from Canada very much cheaper than that. Another thing I found out was that our stores commenced improving on English pastures at once, while Irish cattle took two weeks before they commenced laying on flesh. I was at that time far away from the shipping towns, consequently, the farmers who do not go from home much had to depend on the home markets instead of going to Sunderland or Liverpool to buy the cattle after landing. If a ship load could have been sent to Darlington market at that time they would have been disposed of readily at capital prices. Instead of the farmers there getting them at first price, the cattle go through several hands and the profit is eaten up by commissions. I was driven to Raby Castle, one of the seats of the Duke of Cleveland, who owns nearly half of the land in Durham. He has one singularity: he requires all of his tenants to whitewash the buildings and stone fences once a year. This must be done, even if some of the rent is forgiven. The castle is very old, with a moat around it It has some handsome pictures and statuary, very fine gardens, hothouses and vineries. The park is immense, and there are over 300 deer running about in it. The Duke is over 80 years of age, and has no heir to his vast possessions. We drove through several old villages and through a magnificent farming country—such fields of turnips and crops of hay and pastures!

I left my relatives with regret on the evening of the 16th of July and went across country to the western coast of England, and stayed all night at Gr on-the-Sand, a sea-side watering place in the county of Cumberland, on Morecombe bay. The next day I visited the Short Horn herd of Bates cattle, belonging to the Duke of Devonshire, at Holker Hall. I found Mr. Drewry, agent for his Grace, at home, in a beautiful spot close by the Hall. The station I arrived at was Cark-in-Cartmel, on the Furness railway. Mr. Drewry kindly took me to see the herd in the adjoining fields. I found them a very good lot, indeed; consisting of Grand Duchess of Oxford, Duchess of Holkers, Baroness Oxfords, Winsomes, Barringtons and Lallys, and consisted of about 60 cattle. They had a very large sale last year of 160 head, which averaged 150 guineas a-piece. This was the best Bates herd I saw in England; but I must say, in all fairness, it was the only pure Bates herd I saw on their own pastures. Mr. Drewry having soon to leave, I was taken in hand by his secretary and escorted over Holker Hall, one of the country residences of the Duke of Devonshire. The garden and grounds were beautiful, over 100 fallow deer in the park; also a great many rare trees and shrubs, with a lovely rose garden. The climate on this west coast is temperate in winter. The Hall is comfortably and solidly furnished, the pictures very old and rare, and the portraits of the family very curious. On the farm they have a saw mill and all kinds of machinery run by steam. The little village of Holker is a curiosity. They are all employees of the Duke, and have pretty cottages covered with ivy and climbing roses of rare and beautiful kinds. The whole was a picture of rural simplicity, contentment and happiness. The old people are pensioned when past working, the little girls curtesy and the boys touch their hats. There is also a reading room filled with papers and books open to all. A Canadian can hardly grasp the idea that one man can own so much. In the afternoon I visited Lake Windermere, in Cumberland, and sailed up to Ambleside and back again. The lake is very narrow, but long. It is very beautiful, great hills looming up in the distance on either side. It only took two hours to make the round trip, and at five o'clock I started for London, arriving there at 11 p.m.

Monday, July 2nd, started early in the morning for Scotland by the Midland railway, passing through Carlisle, nine miles from the border line of Scotland, where we stop first at Gretna Junction (who has not heard of Gretna Green?), and then cross the Sark river and enter bonnie Scotland; dash on through classic ground, past Annan, the birthplace of Simon Beattie, the well-known importer of stock to Dumfries, where Burns died and is laid at rest. Changed carriages at Dumfries for the Stranraer line, passing through Dalbeatie and on to Castle Douglas, where I landed, not knowing that there was another station Brig o' Dea almost on the property of Mr. Andrew Montgomery of Nether Hall, whose kind invitation to visit him I had accepted. I was soon driven from Castle Douglas to Nether Hall, on the banks of the Dea, where I was made welcome. It is an enchanting spot, with a view from the windows of a splendid modern mansion—which should have been called the "Castle of Montgomery"—of the ancient ruins of Castle Douglas on a small island in the river, built by the Black Douglas in feudal times. I found Robert Graham, of Claremont, there, getting his supply of horses for the season, as also Mr. Wm. Montgomery, of the Banks, so I had a pleasant evening. The next morning we all started early for Wigtown, to attend the agricultural show being held there, of which the Earl of Galloway is president. Here Galloway cattle were seen on their native heath. They are first in the catalogue, and there were 70 entries for this one-day show. The Earl is a large exhibitor and also contributes largely to the premium list. His cattle were just driven in from the fields and not fitted up for show, and were a grand, sturdy lot. Then came Ayrshires, 80 entries—and what a treat it was to see such a splendid lot of milkers in their native land, and in their natural state, just from the pastures! Of Short Horns there were only nine entries, and only ten entries of grades. We next came to Clydesdale horses, pure and simple, over 200 entries, at a country show, and a grand lot they were, of all ages—principally mares and young entire colts. The above classes are the sources of the wealth of this part of Scotland. The show of sheep was not large, and consisted principally of rams of long-wooled varieties, to be used to cross with the black-faced sheep of the native soil. There was also a fair display of cheviots. I thoroughly enjoyed this show, my first in Scotland, where Clydesdale horses, Galloway and Ayrshire cattle were the chief factors, as Shire horses and Hunters, Short Horn cattle and Jerseys are in England. I did not see any swine on the grounds. I spent another night with my kind host, and started next morning with him and Graham for Glasgow, where we stayed a few hours. I called on Mr. Arch. McNeilage, the well-known secretary of the Clydesdale Horse Association, whose name is a household word in America amongst the lovers of the Clydesdale pedigreed horse. We then pushed on to Aberdeen, a slow trip—the railways are not as fast as in England. We passed through the heart of Scotland, with its romantic and varying scenery so well described by Burns and Sir Walter Scott. We arrived at the solid granite city in good time and put up at the Hotel Douglas, and spent the evening very pleasantly chatting with the intelligent lot of farmers staying there, ready for the Royal Northern Agricultural Show, to be held at Kittybrewster, a suburb of Aberdeen, the next morning, and of which show the Earl of Aberdeen is president. I give below the programme for the day, which is certainly unique—the greatest amount of work crowded into one day I ever heard of:—

Showyard open at 5 a.m. Implements and stock gates closed at 6.45 a.m.

Judging of stock and implements to commence at 7.30 a.m.

Public admitted at 7.30 a.m. Members free. All others—from 7.30 a.m. till 12 noon, 2s. 6d.; from 12 noon till 5 p.m., 1s.; and from 5 p.m. till 8 p.m., 6d.

Horse-shoeing competitions from 9 a.m. and 2.30 p.m.

Butter-making competitions from 10 a.m. and 2.15 p.m.

Lectures on butter-making and demonstrations, 12 noon and 4 p.m.

Meeting of Polled Cattle Society at 12.30 p.m.

Meeting of committee to decide on protests, &c., at 1.30 p.m.

Public luncheon in showyard at 2 p.m. Presentation of Society's prize and challenge cups, &c.

Parades of horses and cattle at 12.30 p.m., 4 p.m., and 6 p.m., followed by driving, leaping, and riding.

No admission after 8 p.m. Yard cleared at 8.30 p.m.

As Aberdeen is a noted county for the raising of short horn cattle, the catalogue commences with them, and there were fifty-five entries, and would have been many more, had not the Highland Society embargoed all cattle shown there from being shown at Dundee on account of Aberdeen being scheduled because of pleuro neumonia. In aged bulls, there was a close thing between Fetterletter Booth (55725) owned by D. C. Bruce of Broadland, a four-year-old roan of good quality, and Sittyton Fame (55078) bred at Sittyton and owned by James Durno of Jackstown, a white bull and a good one. No objections are raised in Scotland and England to this, a thing so unusual in Canada. The first prize was given to Fetterletter Booth, the third was awarded to George Reid of Bruiach, for Lord Roseberry, a good roan bred by Wm. McDonald of Waterbury. In two-year-old bulls, Mr. Bruce was again first for Cock of the Walk (57072), a roan and son of the winner in the aged class. Very close after him came Star of the Morning (58189), another good roan bred by the celebrated breeder Wm. Duthie of Collyme, whose acquaintance I made during this show. His bulls have been wonderfully fortunate of late in the prize ring. He is also the fortunate purchaser of a lot of the Sittyton cattle that were not shipped to South America. I was sorry I could not accept his invitation to visit his grand herd. The third prize was awarded to John Knight of Kinbrae, for White Victor, bred by John Wilson of Piries Mill. In yearling bulls, Mr. Alex. M. Gordon of Newton, won easily with Marplot, a roan of fine quality. He is sired by a royal winner, Mario (51713), and out of Actress, bred by Mr. Gordon. Mr. James Bruce of Inverquhomery, came second with Cap-a-pie, a roan, with rather a heavy horn, sired by Clear-the-Way (47604), who sold for 140 guineas. Mr. David Nicol of Upper Auguston, came third with Mountain Gem, bred by W. S. Marr of Uppermill, out of a Myssi 73rd. "Silver King," owned by A. W. Still of Nether, Auguston, and bred by the veteran Silvester Campbell, of Kinellar, whom I had the pleasure of meeting for the first time, but of whose cattle I had seen and recorded many. In short horn cows of any age, Mr. Alex. Innes, Cushme, with a cow over 11 years of age, came first, and Campbell of Kinellar, second, with Wimple 14th, a five-year-old roan of exceptionally grand quality, by a good many thought to be the best. The third place was taken by Windsor Belle III, a roan 3 years old, bred by Lady Gordon, Cluny Aberdeen. An unusual prize to me, for best pair of breeding cows, came next, and first place was taken by David Nicol, of Upper Auguston, for Butterfly and Beatrice of Auguston, a pair of nice four-year-olds, second place was taken by D. Davidson, of Cabra, with two large cows, Annie of Lancaster IV and Annie Jane of Lancaster. In two year old heifers, the veteran S. Campbell won easily with a wonderfully grand red heifer, Maid of Promise 1st, by General Booth (54353). She took first at same show last year and at Blackburn. In my estimation that was the finest short horn on the ground. Her top line was perfect, capital in front and everywhere. I should like to see her in Canada. Second place went to A. M. Gordon, of Newton, for Marietta, by Mario (51713). Third place to a roan bred by D. Davidson, of Cabra. In yearling heifers, S. Campbell won first and fourth with Mina, a roan by Sillyton Bull Gravesend (46461) and Nonpareil, a red, by Royal James (54973). Second place was taken by Augusta XXIX, by Clear the Way (47604), bred by J. Bruce, of Inverquhomery, and third place to Pine Apple II, a roan, by James Morson, of Craigwillie. I have gone more into particulars over these Aberdeen short horns as the name of the owner and breeder are household words with us in Canada, and it was a great pleasure to me to meet the Duthies, Bruces and Campbells of Aberdeen, so well known to us. My truly regret was not seeing any of the Cruickshanks, but they have all gone out of the business.

The show of Aberdeen Polled Angus was good, about 60 entries. Amongst the exhibitors was Her Majesty the Queen, Abergeldie Mains, the Earl of Aberdeen, the Marquis of Huntley, Aboyne Castle, the Countess of Seafield Cullen House, Cap. E. Fraser of Williamston, A. Ferguson of Overhill, Lord Tweedmouth, of Guis-achan, A. Duff, of Hatton Castle, Adam Todd, Nethermills, Wm. McCambie of Skene, and several others. Her Majesty took first on herd, and the Marquis of Huntley second.

Next in interest comes the show of Clydesdale horses, 187 entries competing together, and what is more they were not all Prince of Wales and Darnley get, but a grand display of the representative Clydesdale horse of Scotland before being boiled down for the Highland Show. In aged stallions there were 10 entries, three of which were owned by Alex. McRobbie, of Sunnyside, Aberdeen. The first place was awarded to Prince of the Forest (6199), owned by C. Lawson, Mains of Cults, and bred by John Fyche Treaton, Fifeshire, sire Gallant Lad. In the class of three-year-olds there were 15 entries, 5 of which were contributed by McRobbie, of Sunnyside. Bounding Prince, owned by C. Lawson, Mains of Cults, and bred by J. Turnbull, Fauldhope, Selkirkshire, was first. McRobbie took second and third. In two year old colts, there were 36 entries, and a magnificent lot; the first place and afterwards the championship of the show was taken by Mount Royal (8065), owned by George Bean, Balquharn Mains, Pitcaple, and bred by David Mitchell, Westmill. He is sired by the well known St. Lawrence (3220), and out of Glenochiel Kate (7629), he had already taken two firsts at local shows, and afterwards at the Highland, at Dundee, took fifth place. In yearling colts there was also 36 entries, and a good lot, but not as large as we expect to see in Canada. First place was given to Sir Jacob, by Sir Maurice, out of a Darnley mare.

In mares and fillies there were nearly 70 entries. Mr. John Marr, Cairnbrogue, Oldmeldrum, won the championship for the best draught mare with Zehnet (7810), by Darnley (222), a grand mare 6 years of age and bred by Alexander Baird, Urie, Stonehasen, and of the true Clydesdale type. For three-year-old fillies W. W. H. Lumsden, of Balmedie House, took first with Lady Sybil, bred by Wm. Agnew, Baluherrie, Stranraer. She is also sired by Darnley (222). Second place was given to Alex. McRobbie, for Bonnie Annie, sire Pride of the Clans (4632). In two year old fillies, Mr. George Bean, Balquham Mains, comes first with Sunflower, bred by John Adair, Springbank, Stranraer, and got by Prince of Wales (673). Second place went to Darling, by Cairnbrogie Clamp (4274), bred and owned by John Marr, of Cairnbrogie In yearling fillies, Mr. W. H. Lumsden, was victorious with Balmedie Madeline, by Royalist (6242). She also won the Sweepstakes for best filly in the yard. A very good class was also the draught geldings, three, two and one-year-old. The show of roadster horses was very good, showing fine size and action.

The show of sheep was not very large and do not require comment, hardly any swine. A very fine show of poultry and collie dogs, for which latter large prizes are given, and the principal feature of the show. On the ground I met Messrs. Catto and McLean of Toronto, showing that the world is not very large after all. I left the same evening for Inverness, still further north, it took 5½ hours to travel about 100 miles, speed not being a consideration on the north of Scotland railways. I passed a great many good farms, and plenty of hills and valleys, most beautiful scenery. The next day I sailed through the Caledonia canal from Inverness to Oban, a grand trip right across Scotland, through a great many locks, as we were ascending the first part of the day, and descending afterwards, saw lovely scenery, mountains such as Ben Nevis, valley and streams ever changing but always beautiful, saw sheep and highland cattle on thousands of hills, landed to see a wonderful water-fall, Fall of Foyers, 90 feet in height, and revelled in the heather. At Fort Augustus we had time, while passing locks, to visit a modern Benedictine Abbey, we also passed several old castles built in ancient days; we transhipped at Fort William and steamed the rest of the day through friths to Oban, where I remained all night. The next day I took train to Crianlarich and travelled through the celebrated glens and mountains, once the home of Rob Roy, then by coach to Ardluce, through the Glen Falloch, after lunch took steamer down Loch Lomond to Inversnaid, then coach to Stronachlacher, over beautiful mountainous country, then steamed down Loch Katrine, past Ellens Isle, to the Trossachs, then by coach to Callender, passing over the

Brigg of Turk and past Loch Venacher, all so familiar to readers of Scott's Lady of the Lake. From there to Edinburgh by rail, finished a very enjoyable day. Spent Sunday and Monday in this beautiful city. Met several Toronto friends, visited the Cannongate, Cowgate and other old streets, saw the heart of Midlothian, gazed at the Calton Hill, Sir Arthur's seat, the castle and Holy rood, walked on the Leith road to that town, and took steamer to see the Forth Bridge, gazed at the Park, wandered on Princess street, and admired the colleges. Also with Dr. Smith, of veterinary fame, visited the celebrated Royal (Dick's) Veterinary College, established in 1823, where Dr. Smith received his veterinary education. It was started by the Highland and Agricultural Society of Scotland, and supported by them at first, the same as the Toronto Veterinary College was first established by the Agriculture and Arts Association. A new building was constructed in 1886, which is very commodious, and well adapted for the purpose. This college was endowed by Prof. Dick, who died in 1866. It is the only endowed Veterinary college in Great Britain. During Prof. Dick's lifetime and since his death the College has educated upwards of 1,200 veterinary surgeons, and it numbers amongst its graduates those occupying the highest and most responsible positions in the profession. Prof. Thos. Walley, M.R.,C.V.S., presides over it. The new Veterinary College of Edinbrugh is another fine new college, presided over by Prof. W. Williams, V.S., and is in good standing, having splendid lecture rooms and stables with all these good features and improvements, they are not as commodious or as largely attended as those of our distinguished townsman, Prof. Smith. Tuesday morning, 29th of July, found me in Dundee, to attend the Highland Societies' show in that city. I received every courtesy from the management. The secretary, Mr. Menzies, and Dr. Williams, V.S., introducing me to several of the directors. The Rev. W. Gillespie, editor of the Galloway Herd Book, was very kind, asking me to lunch with the directors, and favoring me into the ring to see the judging of the different classes of animals ; I also met several breeders whom I had seen in England, and R. Graham, of Claremont still looking for horses for our country. The show was held on a piece of ground reclaimed from the river Tay, close by the docks, and the surface consisted chiefly of coal dust, no grass and no heather and not a bit like Scotland. The prevalance of pleuro-pneumonia in the north, also prevented a great many animals coming forward that were entered. Still the show was good. The Aberdeen, Angus and Aryshire cattle, Clydesdale horses, and black faced, Cheviott and Border Leicester sheep alone making a characteristic Scotch show. Short horn cattle come first on the list, as Aberdeenshire and other counties in Scotland are noted for them. Lord Polworth of Mertoun House, St. Boswells, made a splendid show in this class, by far the best lot on exhibition, the Aberdeen people not turning out, neither were there any English cattle ; no doubt the fear of disease prevented them. In aged bulls, Mr. Horatio, Ross MacRae, of Clunes, Inverness, took first with Royal Sceptre (54987), a Duthie bull, by Field Marshall. The second went to Salisbury (56523), bred by Lord Lovat, and owned by James Matheson, of Ross-shire. The third went to Sunray (56623), also bred by Lord Lovat, sired by Bannockburn, the same as the last, and owned by Wm. Peterkin, Dunglass, Conan Bridge. In section 2, for two year olds, Lord Polworth came first with Flag of Truce, a white bull sired by Sir Arthur Irwin (44016); he also won the silver medal for best short horn bull on the ground, he also was reserved at the Royal at Plymouth. Mr. James McWilliam, of Stoneytown, Keith, took second with Eastern Star, a red of good quality, by Rising Star (54920). Third went to Mediator, a red Sylvester Campbell bred bull, by Gravesend (46461), and owned by James Thomson, Montrose. In yearlings, Lord Polworth, was first with Windsor Royal, a roan Booth, by Royal Riby (52056).

Second went to Farmer's Fancy, bred by Lord Lovat, and owned by Hugh F. Rose, of Fort George, Station. Third went to Colorado, a red bred by Mr. J. Fortescue, Aberdeen, and owned by W. J. Matheson, of Ross-shire. In cows Lord Polworth was first with Wave of Loch Leven, she was also the reserve winner at the Royal at Plymouth. Rosebud XI, by Prince Charming, took second, owned by James Scott, Kelso. Third went to Mermaid, a white cow bred and owned by James McWilliams, of Stoneytown, Keith. In two-year-old heifers, Lord Polworth was first and second, with Truth, red and white, by Sir Arthur Irwin (44016), and Countess of Irwin, red and white, by same sire. The former was also first at Plymouth. Maud, by Royal Victor (52,068), was third owned by James McWilliams, of Keith. In yearling heifers, Lord Polworth again led with Gladsome Wave, by Patrician (54785). Second went to Golden Gift, by Democrat (55560), roan, owned by McWilliams, third to Averne IX, roan, by Plantagenet (57568), owned by John Smith, Balmain, Fettercairn.

Aryshires made a fine turnout in quality, the numbers were not great, as the county of Aryshire was a good distance away. Mr. Andrew Mitchell, Barcheskie, Kercudbright, a good herd. Hugh Drummond, Mauthline; Robert Montgomerie, Lessnessock, Ochiltree; Robert Osborne, Ochiltree; R. H. Walker, West Cald; Andrew Allan, Dalry; John Lindsay, Castle Douglas; M. I. Stewart, M. P., Dumfries, Alex. Cross, Knockdon, Maybole; John Holm, Neilston; Robert Wilson, Kilbarchan, and James Wilson, Boghall, Houston, were amongst the exhibitors. I was much pleased with them and the nice way they were trimmed and handled.

Aberdeen Angus, made a magnificent display, 108 entries, of characteristic animals of a high standard of merit, the parade of these animals was worthy of a trip to Scotland. They were the gems of the show.

Galloways, made also a good display, 40 entries, of a good class, from the herd of the Duke of Buceleugh and Queensbury. James Cunningham, of Dalbeattie, and Thomas Bigger & Sons, Chapelton, Dalbeattie, being the principal exhibitors.

Highland cattle, the show of these were fine, 63 entries. I had no idea that such a fine display could be made of good sized, picturesque animals, and no doubt splendid beefers.

Clydesdale horses. The show of these fellows was magnificent, 127 entries. John Gilmour of Montrave, Leven, came first in aged horses with Prince of Albion (6178), he has also been first at the Highland for three years before, but was this year beaten for the championship, by a yearling colt, Prince Alexander, one year and two months old. Second went to David Riddell, of Paisley, for Bonnie Prince, by Prince of Wales (673), a bay, 6 years old. Third went to Peter Crawford, of Dumfries, for Look Again (5972). In three-year-olds, Darnley's Last (6663), a dark brown, owned by Wm. Renwick, of Corstorphine was first. Conspiracy, a chestnut, bred by the Marquis of Londonderry, Seaham Harbor, Durham, Eng, and owned by David Riddell, of Paisley, came second. Peter Crawford, of Dumfries, got third and fourth, with Laurence's Heir (6931), and Master Young, by Ardnacraig (4812). Two-year-olds were the strongest class hown, 21 in number. First honors went to Prince of Carruchan (8151), by Prince of Wales (673), owned by John McCaig, Stranraer. He has been let to armers in Perth and Brechin districts for £10 a service, and £5 additional for ach foal. Orlando (8092), also by Prince of Wales, came second, and is owned y James Johnston, Lochburnie, Maryhill. He was a capital mover. Peter Crawford was third with Laurence Again (7909), a good colt with grand bone and action. In yearling colts it would hardly be possible to imagine a better than Prince Alexander, the crowning achievement of Prince of Wales as a sire, out of a mare by Darnley (222), thus having equal shares of the blood of the two most distinguished horses ever raised in Scotland. He was placed first in his class, but in competition with Prince of Albion, Darnley's Last and Prince of Carruchan, he downed all before him and gained the Clydesdale Horse Society's champion prize of £25. He was bred by Alex. Black, of Craigeneroch, Stoneykirk. It is to be hoped that Mr. Wm. Renwick, of Meadowfield, Corstorphine, the fortunate owner, paid a handsome douceur for him. It was said that £1,000 was refused for him. The second place was taken by Rosemount, a likely son of Prince of Albion (6178), bred and shown by R. & I. McAlister, Rothsay. Third place was given to Victor Erskine, a son of Lord Erskine (1744).

The females did not compare with the males in quality or style. Scottish Marchioness, by Prince Robert (7,135), breeder unknown, owner R. Scott, of Skelmurlie, not recorded, (they do not look at pedigrees so much where all are Clydes. Second, Topsman's Princess (8403), by Prince of Wales, owned by John Galbraith, of Killcarn, Lady Erskine, by Lord Erskine (1744), came third, owned by George Shepard, Tarves, Aberdeen, In three-year-old mares, the celebrated Sunrise, champion for 1889, by Darnley (222), and owned by Riddell, of Paisley, deservedly came first. She also gained the championship for this year. She was followed closely by Princess II, also by Darnley (222), bred by J. M. Hannah Girvan, and owned by Edward Balfour, of Balbirnie, Markinch, a splendid pair of mares. Third place went to Lady Mayone Erskine, by Lord Erskine, owned by W. H. Lumsden, of Balmedie, Aberdeen. Fourth went to another Darnley mare, Zehnet (7810), bred by John Marr, of Cairnbrogie, Old Meldrum. This was the best female class. There was also a class for three-year-old fillies, Montrose Gay Lass, by Garnet Cross, was first, Scottish Rose, by Darnley, owned by S. R. Scott, of Skelmurlie, was second, and Sunshine, by Macgregor (1487), bred by Wm. Montgomery, Banks, Kercudbright, and owned by David Cross, of Ingleton, Bishopton was third. In two-year-olds, as at Plymouth, Scotish Snowdrop, by Prince of Wales (673), owned by S. R. Scott, Skelmurlie, was first. Earl Candor, of Stackpole Court, South Wales, came second with Decretio, by Flashword. Lord Polworth, of St. Bosswells, was third with Conny Nairn, by Prince of Wales, sire Darnley. Yearlings were very uniform, a Prince of Wales filly, Montrave Maud, owned by John Gilmour, of Montrave, was first. A Prince Laurence filly, called Duchess II, of Girvan, owned by Robert Murdoch, of Glasgow, came second, and Balmedie Madeline, by Royalist (6242), came third. In nearly all cases, either Prince of Wales, Darnley or Macgregor blood was in the prize animals.

The show of light horses and hunters did not nearly come up to the English shows.

The show of sheep was entirely novel to me, at least the black faces, I was agreeably disappointed in finding them large, well woolled and exceedingly fine in proportion. I met Mr. Archibald, of Todlane, the owner of the best, and was pleased to compliment him on their appearance. Cheviots were out in good number, and Border Leicesters still more ; they were a fine lot and I found myself more at home amongst them. There were very few Downs, Shropshires predominating. The show of pigs did not amount to much. The poultry were good.

I left Dundee at 4 o'clock p.m. for Melrose, passing through Edinburgh. The next day was devoted to visiting, first Melrose Abbey, which I did before breakfast. Then drove to Mertoun House, the residence of Lord Polworth. six miles away, to see his herd of cattle and Border Leicester sheep. I had met the sons at Plymouth and Dundee, although they were not at home and their show stock which I had seen was at Dundee, there was plenty left, of lovely Booth short horns to feast my eyes on, but the greatest treat was to go to another farm and see his famous Leicester sheep. It was the finest lot I ever saw in my life. He sells and lets the Tups at Kelso every year and obtains immense prices for them. Several of his sheep come to Canada. Mr. Whitelaw, of Guelph, and J. Kelly, of Shakespeare, often getting rams from him. On my way back to Melrose I visited Drysborough Abbey, another lovely old ruin, and the burial place of Sir Walter Scott and his wife. The tomb is amongst the ruins, and they are all covered with ivy. Every inch in this part of the country is historical on the estate of Lord Polworth, whose family name is Scott. He is also a relation of Sir Walter. I got out to look at an old parish church and found the chain of a pillory hanging from the wall with the iron collar used to tie up refractory subjects over a century ago to the church walls in sight of every body going to church. I crossed the Tweed river on a cranky suspension bridge, and back to Melrose, then in the afternoon drove to Abbotsford, the curious and lovely old home of Sir Walter Scott, filled with all his collections of art and history. The rooms appear just as they were used by him in his life time, on the banks of the Tweed in Bonnie Scotland. This, to my regret, was my last day in this time-honored country, as by the modern means of connection I reached Liverpool that night. Spent one day in that immense shipping port, then on board the good steamer Etruria for New York, and home.

PRIZE AWARDS FOR HORSES AND CATTLE AT TORONTO, LONDON AND OTTAWA.

THOROUGHBRED HORSES.

Stallion, 4 years old and upwards.

TORONTO.

1st. Jos. G. Seagram, Waterloo, “Buffalo” ; sire, Billet ; dam, Belle Palmer.

2nd. Jas. Noble & Co., Owen Sound, “Gascon” (imp.) ; sire Arrogance ; dam, Avontes.

3rd. Jas. Mannell, Toronto, “Meteor” ; sire, Asteroid ; dam, Maria Innis.

LONDON.

1st. Jno. B. Martyn, Forest, “Ranlagh II” ; sire, Cremorne ; dam, Miss Evelyn.

2nd. F. W. Schwendiman, Drayton, “Longspin” ; sire, Long Tow , dam, Evelyn Caster.

OTTAWA.

1st. Robert Thompson, Ottawa.

Stallion, 3 years old.

TORONTO.

1st. Wm. Hendrie, Hamilton, “Tullochgowan” (imp.) ; sire, Glenelg ; dam, Schott.

LONDON.

1st. J. D. O'Neil, V.S., London, “Gold Fox” ; sire, Grenada ; dam, Jetsam.

Stallion, 2 years old.

TORONTO.

1st. Jno. Gilkinson, Orangeville, “Faugh-a-Ballagh” ; sire, Pirate Chief ; dam, Lady Stamford.

2nd. Jno. Dyment, Orkney, “Gladstone” ; sire, Terror ; dam, Nettie.

Yearling Colt, entire.

TORONTO.

1st. Jno. Dyment, Orkney, “King John” ; sire, King Bob ; dam, Lucy Lightfoot.

2nd. Wm. Hendrie, Hamilton, “Early Bird” ; sire, Van Dom ; dam, Bonnie Bird.

3rd. Jno. Dyment, Orkney, “Bob King” ; sire, King Bob ; dam, Rosabella.

LONDON.

1st. Jas. Brady, Glanworth.

Stallion, any age.

TORONTO.

1st. Jos. G. Seagram, Waterloo, “Buffalo ; sire, Billet ; dam, Belle Palmer.

LONDON.

1st. Jno. B. Martyn, Forest, “Ranlagh II” ; sire, Cremorne ; dam, Miss Evelyn.

OTTAWA.

1st. Robert Thompson, Ottawa.

Mare or Gelding, 4 years old or upwards.

TORONTO.

1st. Jno. Dyment, Orkney, “Black Bird” ; sire, Big Sandy ; dam, Nettie.

2nd. Jno. Dyment, Orkney, “Aunt Alice” ; sire, Terror ; dam, Ada

3rd. Jno. Dyment, Orkney, “Rosabella” ; sire, Inspector ; dam, Nettie.

Three-year-old Filly.

TORONTO.

1st. Wm. Hendrie, Hamilton, “Pibroch” (imp) ; sire, Glenelg ; dam, Lady Planet

2nd. Jno. Dyment. Orkney, “Allie D” ; sire, Terror ; dam, Nettie.

London.

1st. T. D. Hodgens, London, "Kitestring" ; sire, Strachino (imp.) ; dam, Curtolima.

Two-year-old Filly.

Toronto.

1st. Jno. Dyment, Orkney, "Annie D" ; sire, Terror ; dam, Rosabella.
2nd. Jno. Dyment, Orkney, "Arrow" ; sire Van Horne ; dam, Aunt Alice.
3rd. Jno. Dyment, Orkney, "Volga" ; sire, Francis L. ; dam, Olga.

Yearling Filly or Gelding.

Toronto.

1st. Wm. Hendrie, Hamilton.
2nd. Jno. Dyment, Orkney, "Combine" ; sire, King Bob ; dam, Fanny.
3rd. Jno. Dyment, Orkney, "Fanny Kirk" ; sire King Bob ; dam, Maggie May.

Brood Mare, with foal by her side.

Toronto.

1st. Wm. Hendrie, Hamilton, "Bonnie Bird" ; sire, Judge Curtis ; dam, Bonnie Brae.
2nd. Jno. Dyment, Orkney, "Lucy Lightfoot" ; sire, Big Sandy ; dam, Nettie.
3rd. John Dyment, Orkney, "Maggie May" ; sire, Big Sandy ; dam, Nettie.

London.

1st. T. D. Hodgins, London, "Curtolima" ; sire, Judge Curtis ; dam, Folima.
2nd. Nelson Sage, London, "Mary Williams" ; sire, Barney Williams ; dam, Lady of the Lake.

Foal of 1890.

Toronto.

1st. Wm. Hendrie, Hamilton, "———" ; sire, Strathspey ; dam, Bonny Bird.
2nd. Jno. Dyment, Orkney, "King Joe" ; sire, King Bob ; dam, Lucy Lightfoot.
3rd. Jno. Dyment, Orkney, "King Harry" ; sire, King Bob ; dam, Maggie May.

London.

1st. T. D. Hodgins, London, "———" ; sire, Newcomb ; dam, Curtolima.
2nd. T. D. Hodgins, London, "———" ; sire, Newcomb ; dam, Lady Lucy.

Best Mare, any age.

Toronto.

1st. Wm. Hendrie, Hamilton, "Bonnie Bird" ; sire, Judge Curtis ; dam, Bonnie Brae.

London.

1st. T. D. Hodgins, London.

Ottawa.

1st. Alex. Blyth, Ottawa, "Orminda."

ROADSTER HORSES.

Stallion 4 years old and upwards, not less than 15 1-2 hands.

Toronto.

1st. Oakdale Stock Farm, Pickering, "Forest Mambrino," 9865 ; sire, Mambrino Patcher ; dam, by Mambrino Chief.
2nd. J. M. Whitlaw, Paris, "Tristam," 5583 ; sire, Oxmoor ; dam, by Mambrino Patcher.
3rd. Wm. S. Taylor, Elmbank, "Belmont Star" ; sire, Old Belmont Star ; dam, ———

London.

1st. Excelsior Stock Farm, London, "Moorelight," 9337 ; sire, Twilight, 315 ; dam, Lady Cair by American Clay.
2nd. H. McClurg, Falkirk.
3rd. J. E. Coughlin, London.

Stallion, 3 years old.

TORONTO.

1st. H. G. Charlesworth, Toronto, “ Honest Wilkes ” ; sire, Hambletonian Wilkes ; dam, Bay Molly.
2nd. F. W. Kennedy, Ayr, “ Norvelle,” 10213 ; sire, Nuggett 1398 ; dam, Vesper Bell.
3rd. Jos. Quinn, St. Catharines, “ Col. Stanton ” ; sire, General Stanton ; dam, May.

LONDON.

1st, F. Kelly, Glencolin, “ Ruric Cossock,” 6895 ; sire Don Cossock ; dam Letty Cuyler.
2nd, E. Hanham, St. Marys, “ Stone River,” 10368 ; sire, France, 2472 ; dam, Rigolette.
3rd, Jas. Cathcart, St. Marys .

Stallion, 2 years old.

TORONTO.

1st, W. J. Murray, Brooklin, “ Ohio Wilkes ; ” sire, Dunton Wilkes ; dam, Mohawk Rose.
2nd, W. P. McClure, Woodstock, “ St. Jerome ; ” sire, Buffalo Bill ; dam, Miss Clear Grit.
3rd, Ward Bros., Utica, “ Little Frank.” ——

LONDON.

1st, J. A. Dawson, “ Tempo.”
2nd, Thos. Hey, Ailsa Craig, “ Four Lines,” 11269 ; sire, Western Sprague ; dam, Egotism.
3rd, Wm. Amos, St. Marys, “ Young Grit ; ” sire, Chestnut Joe ; dam, by Old Clear Grit.

Yearling Colt, entire.

TORONTO.

1st. Geo. Arnold, Sutton, “ King Rose ; ” sire Kingsman Wilkes ; dam, Rosehill Maid.
2nd, Wesley Cline, Binbrook, ——— ; sire, Frank Ellis ; dam, by Highland Boy.
3rd, Thos. Lapslie, Seaforth, ——— ; sire, Carlisle ; dam by Old Clear Grit.

LONDON.

1st, S. P. Thompon, Innerkip, “ Volunteer Wilkes ; ” sire, Dillard Wilkes alias Ready Money ; dam, Vanley.
2nd, Chas. E. Bateman, Longwood, “ Alpha Bell ” 10941 ; ” sire, Wilkes Barre, 5244 ; dam, Cassia Wilkes.
3rd, Wm. McClurg, Falkirk.

Stallion of any age.

TORONTO.

1st, W. J. Murray, Brooklin, “ Ohio Wilkes ; ” sire, Dunton Wilkes ; dam, Mohawk Rose.

LONDON.

Excelsior Stock Farm, London, “Moorelight,” 9337.

Three-year old Gelding.

TORONTO.

1st, A. W. Green, Toronto, “ Simon G. ; ” sire, Sim Watson ; dam, by Telegraph.
2nd, J. B. McInally & Co., Simcoe.

Three-year old Gelding or filly.

LONDON.

1st, Drs. T. & C. Duncombe, St. Thomas, “ John Shannon ; ” sire, Stanton, Jr. ; dam, Leo Bell.
2nd, Lionel Robson, Vanneck.
3rd, Jas. McCartney, Thamesford, “ Maud A. ; ” sire, Young Clear Grit ; dam, by Grey Hero.

OTTAWA.

1st, C. McMonell, Ottawa,
2nd, J. Hulton, Ottawa.
3rd, J. A. McGregor, Brimstone Corners.

Three-year old Filly.

TORONTO.

1st, Wm. H. Speers, Oakville, “ Nellie Belmont ; ” sire, Belmont Star, 1989 ; dam, Daisy.
2nd, Jas. Lawrie, Jr., Mongolia.
3rd, R. M. Wilson, Delhi, “ Alice K ; ” sire, Lowell ; dam, Kitty R.

Two-year old Gelding.

TORONTO.

1st, Claughton Bros., Utica, ——— ; sire, Scalper.
2nd, W. R. Glasby, Toronto, "Wildwood ;" sire, Wildwood ; dam, by Lapadist.
3rd, J. H. Austin, Toronto, "Barney ;" sire, Mercurio ; dam, Annie by Terror.

Two-year old Gelding or Filly.

LONDON.

1st, Ed. McClurg, "Minnie ;" sire, Chester ; dam, Nicklet,
2nd, Jas. O'Neil, Birr.
3rd, Dennis Flood, Arva.

Two-year old Filly.

TORONTO.

1st, Jas. O'Neil, Birr, "Whitefoot ;" sire, Mambrino Sprangle (imp.) ; dam, by Phenomenon, (imp.)
2nd, Morris, Stone & Wellington, Welland, "Wildflower ;" ———
3rd, Robt. Davies, Toronto, "Rose ;" sire, Sherman ; dam, Rose.

Yearling, Filly or Gelding.

TORONTO.

1st, R. M. Wilson, Delhi, "Perfection ;" sire, Waldorf ; dam, Lucy Stanton.
2nd, Isaac Waidell, Smithville, "Maud Belle ;" ———
3rd, Wm. Smith, Seaforth, "Polly B. ;" sire Johnnie B. (Tontine) ; dam, Polly S.

LONDON.

1st, R. M. Wilson, Delhi, "Perfection ;" sire, Waldorf ; dam, Lucy Stanton.
2nd, Wm. Logan, Thorndale.
3rd, Jas. McCartney, Thamesford, ——— ; sire, Young Clear Grit ; dam, by Old Harper.

Brood Mare with Foal of same breed by her side, not less than 15 1-2 hands.

TORONTO.

1st. A. R. Johnston & Co., Hanlan, "Laurie Smith ;" sire, Boston ; dam, by Royal George (C's).
2nd. Jas Kirkland, Mount Healy, "Bay Mare ;" sire, Dillard Wilkes ; dam, by Old Royal George, 9.
3rd. S. Shunk, Edgely, "Jenny ;" sire, Blucher ; dam, Imp. Mare.

LONDON.

1st. Chas. E. Bateman, Longwood, "Cassie Wilkes ;" sire, Favorite Wilkes, 3255 ; dam, Lucy Dingman.
2nd. Excelsior Stock Farm, London, "Kate ;" sire, Major Hunter ; dam, by Campbell's Leopard.
3rd. Robt. Row, Avon, "Minnie."

Foal of 1890.

TORONTO.

1st. Jas. Kirkland, Mt. Healy, "Frank Ellis" 7397.
2nd. C. A. Kelly, West Toronto Junction, "King Forest ;" sire, Forest Mambrino ; dam, Kate.
3rd. H. G. Charlesworth, Toronto, "Bunker Wilkes ;" sire, Honest Wilkes ; dam, Lady Bunker.

LONDON.

1st. Excelsior Stock Farm, London, "Faal ;" sire, Sardine ; dam, by Major Hunter.

Pair Matched Horses (geldings or mares) in Harness, 15 3-4 hands and under

TORONTO.

1st. J. Clark, Brampton, "Nettie ;" sire, Boston ; dam, Jessie. "Stella," sire, Boston ; dam, Jessie.
2nd. R. & S. Porter, Milton West, "Speils," "Floss."
3rd. Isaac Anderson, Toronto, "Maud ;" ———. "Belle," sire, Fulton ; dam, by St. Lawrence.

London.

1st. Dr. Routledge, Lambeth.
2nd. F. S. Lawrason, St. George.
3rd. Jas. McCartney, Thamesford, "Mary Mac ;" sire, Orphius ; dam, by Black Hawk Morgan. "Flora L," sire, Gen. Stanton ; dam, ———

Ottawa.

1st. M. Beasons, Ottawa.
2nd. W. Bothwick, Ottawa.
3rd. W. Young, Broostat.

Single Horse (Gelding or Mare) in Harness, 15 3-4 hands and under.

Toronto.

1st. Robert Davies, Toronto, "Idle Brock.
2nd. Moorehouse & Pepper, Toronto.
3rd. R. M. Wilson, Delhi, "Rysdyk ;" sire, Stanton, Jr. ; dam, Lady Norfolk.

London.

1st. R. M. Wilson, Delhi, "Rysdyk ;" sire, Stanton, Jr. ; dam, Lady Norfolk.
2nd. J. Conn, Alvinston. "Loraine B. ;" sire, Ridgewood ; dam, Torpedo.
3rd. James McCartney, Thamesford, "Little Ted ;" sire, Whistle Jacket ; dam, ———

Ottawa.

1st. C. McMonell, Ottawa.
2nd. J. Hutton, Ottawa.
3rd. J. A. McGregor, Brinstone Corners.

Best Mare any Age.

Toronto.

1st. J. Clark, Brampton, "Stella ;" sire, Boston ; dam, Jessie.

London.

1st. R. M. Wilson, Delhi, "Bert ;" sire, Ed. Burns ; dam, Fanny.

CARRIAGE HORSES.

Stallion 4 years old and upwards, 16 1-4 hands and over.

Toronto.

1st. S. Hisey and Son, Creemore, "Wild Harry ;" 1265, y. c. h. s. b. Vol. 2. imp., sire, Young Emperor, dam, Ballot.
2nd. Alexander Marsh and Sons, Richmond Hill, "Prince Alexander," imp.; sire, Prince George, 235 ; dam, Osman Croft Fannie.
3rd. A. C. McMillan, Erin, "Shining Light," 1178 (imp.) ; sire, Wonderful Boy, 534 ; dam, by Herod, 218.

London.

1st. Fred Row, Belmont, "Candidate," (imp.) 436 ; sire, Young Candidate ; dam, Nellie.
2nd. Dewar and Cameron, Ivan.

Ottawa.

1st. J. J. Anderson, Dominionville, "Clear Grit, jr. ;" sire, Clear Grit.

Stallion, 3 years old.

Toronto.

1st. Jos. Cunningham & Sons, Mayfield, "Young Peacock ;" sire, Duke of Cleveland ; dam, Peacock.
2nd. D. Campbell, Bradford, "Excel ;" sire, Derby ; dam, Fannie.
3rd. H. Walker and S. Shantz, Haysville, "Drap d'Or, jr. ;" sire, Drap d'Or ; dam, Sadia W.

London.

1st. Jas. O'Neill, Birr.
2nd. A. A. Woodward, Strathroy, "Enterprise ;" sire, Highland Frank.
3rd. P. Curtin, Centralia.

Ottawa.

1st. Holmes Bros, Winchester.
2nd. P. Campbell, Lachute, Que.

Stallion, 2 years old..

TORONTO.

1st. Wesley Cline, Binbrook, "———— ; sire Conklin; dam, by Henry Clay.
2nd. R. M. Wilson, Delhi, " Howson ;" sire, Ryshawk ; dam, Lucy.
3rd. S. Hisey & Son, Creemore, " Wild Harry ;" sire, Young Emperor ; dam, Ballot.

LONDON.

1st. G. H. Cook, Ingersoll, " Lord Falmouth ;" sire, Lord Falmouth ; dam, by Dread of the Rock.
2nd. S. W. Carson, Strathroy, " Fidelis ;" sire, Hero of Chester ; dam, Susan.
3rd. John Routledge, Hyde Park.

OTTAWA.

1st. R. Stewart, Aylmer.
2nd. R. H. Wright, Aylmer.

Yearling Colt, entire

TORONTO.

1st. Wm. Tredway, Port Union, " Billy."
2nd. W. P. McClure, Woodstock, "——— ;" sire, Watchman ; dam, by G. D. of Howe's Royal George.
3rd. G. S. Fuller, Huttonsville, " 'Rank ;" sire, Kingfairfield ; dam, Hazel.

LONDON.

1st. John Halborn, Belmont, " Wild Rover ;" sire, Boston, jr.
2nd. Robt. Row, Avon, "Don Cossack."
3rd. R. D. Addison, Otterville, " Sam Jones ;" sire, Luck's All.

OTTAWA.

1st. B. Bothwell, Ottawa.
2nd. W. C. Edwards & Co., Rockland.
3rd. J. Nesbit, Fallowfield.

Stallion, any age.

TORONTO.

1st. S. Hisey & Son, Creemore, " Wild Harry ;" sire, Young Emperor ; dam, Ballot.

LONDON.

1st. Fred Row, Belmont, " Candidate," (imp.), 436.

OTTAWA.

1st. J. J. Anderson, Dominionville.

Pair of Matched Carriage Horses (Mares or Geldings), not less than 16 1-2 hands.

TORONTO.

1st. The B. G. Tisdale Co., Brantford, " Colonel ;" sire, Fulton ; dam, by Royal George. " Major ;" sire, Fulton ; dam, by Royal George.
2nd. Thos. Brownridge, Brampton, "———— ;" sire, Ryshawk. ———— : sire, Ryshawk.
3rd. Grand & Co., Toronto.

LONDON.

1st. R. M. Wilson, Delhi.
2nd. Geo. Rundle, Sparta.
3rd. T. Douglas & Son, Sparta.

OTTAWA.

1st. J. A. McGregor, Brimstone Corners.
2nd. Thos. Birkett, Ottawa.

Pair of Matched Carriage Horses not less than 15 3-4 hands and under 16 1-2 hands.

TORONTO.

1st. Grand & Co., Toronto.
3rd. Thos. Brownridge, Brampton.

Pair of Matched Light Carriage Horses (hackney or light steppers , mares or geldings) ***not less than*** *15 1-4 and not more than 15 3-4 hands.*

TORONTO.

1st. E. W. Cox, Toronto.
2nd. Moorehouse & Pepper, Toronto.
3rd. F. Homer Dickson, Toronto, " Punch." " Baron Rothschild."

LONDON.

1st. R. M. Wilson, Delhi, " Lucy ;" sire, Stanton, jr.; dam, Roxy. " Nelly ;" sire, **Stanton**, jr., dam, Roxy.
2nd. J. A. Ross, London.
3rd. A, Ferguson, Birr.

Gelding, 3 years old,

TORONTO.

1st. James Smith, Highfield, "——— ;" sire, Duke of Cleveland ; dam, Raven.
2nd. J. F. Quin, V.S., Brampton.

3 year old Gelding or Filly.

OTTAWA.

1st. J. Herbert & Son, Ottawa.
2nd. B. Bothwell, Ottawa.
3rd. J. Kennedy, Billing's Bridge.

Filly, 3 years old.

TORONTO.

1st. C. Newhouse, Campbell's Cross, "Nettie ;" sire, Ryshawk ; dam, Dollie.
2nd. W. C. Brown, Meadowvale, " Hattie Bell ; sire, King Fairfield, 35 ; dam, Nell, 8.
3rd. J. B. McInally & Co., Simcoe, " Nelly ;" sire, Luxall ; dam, Kitt.

LONDON.

1st. R. M. Wilson, Delhi. "Daisy ;" sire, Stanton, jr.; dam, Maud.
2nd. J. H. Patrick, Ilderton, "Lottie ;" sire, Highland Boy ; dam, Flora by Prospect.
3rd. Thos. Banting, Brinsley.

Gelding, 2 years old.

TORONTO.

1st. R. M. Wilson, Delhi, "Billy Stanton ;" sire, Stanton, jr. ; dam, Maud.
2nd. Thos. Irving, Winchester.

OTTAWA.

1st. R. C. Spence, Arnprior.
2nd. Alex. Kennedy, Ottawa.
3rd. J. Fairbairn, Billings Bridge.

Filly, 2 years old.

TORONTO.

1st. G. S. Fuller, Huttonsville, " Dot ;" sire, King Fairfield ; dam, Hazel.
2nd. Geo. C. Cheyne, Brampton, " ——— "; sire, Goldleaf ; dam, by Royal George
3rd, Jos. Cunnington & Son, Mayfield, "Mollie ;" sire, Welham ; dam, Peacock.

Two year old Filly or Gelding.

LONDON.

1st. R. M. Wilson, Delhi, " Billy Stanton." (See above, Toronto.)
2nd. Excelsior Stock Farm, London, "Minnie ;" sire, Middlesex ; dam, by Albion
3rd. D. C. Bell, Birr, " Lottie B. ;" sire, Masher.

Yearling Filly or Gelding.

TORONTO.

1st. A. A. Gage, Mount Charles, " Lucy ;" sire, King Fairfield ; dam, Susan.
2nd. Smith & Spratt, Sand Hill, " Flossie ;" sire, Goldleaf
3rd. A. A. Gage, Mount Charles. "May ;" sire, King Fairfield ; dam, Fan.

LONDON.

1st. Geo. M. Doe, Goderich.

OTTAWA.

1st. H. M. Mather, Hurdman's Bridge.
2nd. T. C. Bate. Ottawa.
3rd. R. Hurdman, Hull.

Brood Mare, 16 hands and over, with Foal of the same breed by her side.

TORONTO.

1st. John L. Noble, Cooksville, "———" ; sire, War Cry ; dam, ———
2nd. T. & B. Howden, Milton West, "Dolly ;" sire, Morgan Kennedy, jr. ; dam, Dollie.
3rd. S. Shunk, jr., Edgely, "Mambrino Maid ;" sire, Blucher ; dam, Imperial Maid.

LONDON.

1st. P. Cavin & Sons, North Bruce, "Juno ;" sire, Junior Britain ; dam, Nettie.
2nd. D. C. Bell, Birr, "Lady Rysdike ;" sire, J. E Rysdike ; dam, Charlotte R.
3rd. Geo. Baker, Simcoe, "Nell ;" sire, Sharp's England's Glory ; dam, Culver's mare.

OTTAWA.

1st. T. Fairbairn, Billing's Bridge.
2nd. J. Nesbit, Fallowfield.
3rd. R. Stewart, Aylmer.

Foal of 1890.

TORONTO.

1st. J. B. McInllay & Co., Simcoe, "Prince ;" sire, Luxall ; dam, by Pocahontus Messenger.
2nd. S. Shunk, jr., Edgely, "Mambrino Maid."
3rd. John Clark, Alloa, "———" ; sire, Goldleaf ; dam, by Dick Turpin.

LONDON.

1st. Geo. Baker, Simcoe, "Prince Luck's All ;" sire, Luck's All ; dam, Nell.
2nd. Chas. Guest, Ballymote.
3rd. P. Cavin & Sons, North Bruce, "Julia ;" sire, Highland George ; dam, Juno.

OTTAWA.

1st. P. McIntosh, Billing's Bridge.
2nd. C. Barber, Gabenean.
3rd. A. Greson, Ottawa.

Single Carriage Horse (Gelding or Mare) in harness, 15 3-4 to 16 1-2 hands.

TORONTO.

1st. W. P. McClure, Woodstock, "———" ; sire, Chicago Volunteer ; dam, by Mambrino.
2nd. J. F. Quinn, V.S., Brampton.
3rd. F. C. Grenside, Guelph, "———" ; sire, Rysdyk ; dam, Clarion Chief mare.

LONDON.

1st. R. M. Wilson, Delhi, "Bert ;" sire, Ed. Burns ; dam, Fanny. "Dolly ;" sire Ed. Burns, dam, Fanny.
2nd. T. G. Davy, London.
3rd. Geo. Beattie, London.

OTTAWA.

1st. J. A. McGregor, Brimstone Corners.
2nd. R. Hurdman, Hull.
3rd. C. O'Reilly, Aylmer.

Single Carriage Horse (Gelding or Mare) in harness, not less than 16 1-2 hands.

TORONTO.

1st. R. M. Wilson, Delhi, "Frank Stanton ;" sire, Stanton, jr. ; dam, Fanny Morgan
2nd. F. C. Grenside, Guelph, "———" ; sire, Goldleaf.
3rd. Thos. McQuay, Audley, "Dexter ;" sire, Robert Bonner ; dam, Minnie.

LONDON.

1st. R. M. Wilson, Delhi, "Frank Stanton ;" sire, Stanton, jr. ; dam, Fanny.

Best Mare, any age.

London.

1st. R. M. Wilson, Delhi, " Nellie ;" sire, Stanton, jr. ; dam, Roxy.

Ottawa.

1st. J. Fairbairn, Billings Bridge.

SPECIAL PRIZES—CARRIAGE HORSES.

Best Stallion, any age, with five of his progeny of any age or sex.

Toronto.

1st. Orr & Harrison, Milton, " Ryshawk ;" sire, Jno. E. Ryshawk ; dam, Browne.

HUNTER AND SADDLE HORSES.

Saddle Horse, gelding or mare.

Toronto.

1st. Moorehouse & Pepper, Toronto.
2nd. Grand & Co., Toronto.
3rd. R. Bond, Toronto, "———" ; sire, Milesian ; dam, Lady Albert.

London.

1st. John Fulcher, London, " Grace ;" sire, Young Judge Curtis.
2nd. John Fulcher, London, " Bonnie ;" sire, Lapidist ; dam, Hornpipe.

Ottawa.

1st. W. Davis, Ottawa.
2nd. H. T. Bate, Ottawa.
3rd. A. Lanelle, Ottawa.

Hunter (heavy weight) up to 15 stone.

Toronto.

1st. Moorehouse & Pepper, Toronto.
2nd. Jno. Johnson, Toronto, " Orkney ;" sire, War Cry.
3rd. Jas. Carruthers, Toronto, " Phyllis ;" sire, Revolver.
4th. J. H. Reed, V.S., Guelph, " Duster ;" sire, Henry Clay ; dam, by Sir Latton Sykes (imp.).

London.

1st. John Fulcher, London, " Kildare ;" sire, Canada Southern ; dam, Vandornes.
2nd. John Fulcher, London, " Bronte."

Ottawa.

1st. T. Glascoine, Moorewood.

Hunter (light weight) up to 11 stone.

Toronto.

1st. F. C. Grenside, Guelph, "———" ; sire, Rysdyk ; dam, Clarion Chief Mare.
2nd. Grand & Co., Toronto.
3rd. F. A. Campbell, V.S., Toronto, " Dempsey ;" sire, Saint James.

London.

1st. John Fulcher, London, " Bonnie ;" sire, Lapidist ; dam, Hornpipe.
2nd. John Fulcher, London, " Maud ;" sire, Toronto Chief ; dam, Thoroughbred.

Ottawa.

1st. M. Cerdinel, Ottawa.
2nd. A. H. Powell, Ottawa.
3rd. D. R. Gordon, Ottawa.

Ladies' Saddle Horse, ridden by Lady, if possible.

Toronto.

1st. F. A. Campbell, V.S., Toronto, " Erminie ;" sire, Princeton.
2nd. Moorehouse & Pepper, Toronto.
3rd. J. Archer Watson, Toronto, " Daisy Dean ;" sire, Longstreet ; dam by Kenneth L. Hope.

LONDON.

1st. John Fulcher, London, "Bonnie;" sire, Lapidist; dam, Hornpipe.
2nd. John Fulcher, London, "Darkie."

Horse (best leaper).

TORONTO.

1st. Moorehouse & Pepper, Toronto.
2nd. F. A. Campbell, V.S., Toronto, "Glenora."
3rd. Moorehouse & Pepper, Toronto.

LONDON.

1st. John Fulcher, London, "Sadie."
2nd. John Fulcher, London, "Bonnie;" sire, Lapidist; dam, Hornpipe.

Best Saddle Hunter or Ladies' Horse.

Moorehouse & Pepper, Toronto, "Roseberry."

SPECIAL PRIZES—FOR HUNTERS—HIGH JUMPING.

Light Weight Green Hunters, carrying not less than 154 lbs., best performance over four successive jumps, 4 ft., etc., etc.

TORONTO.

1st. Moorehouse & Pepper, Toronto.
2nd. F. C. Grenside, Guelph.

Heavy Weight Green Hunters, carrying not less than 175 lbs., etc., etc.

TORONTO.

1st. Moorehouse & Pepper, Toronto, "Tempest"
2nd. J. Johnson, Toronto.

Light-Weight Qualified Hunters, carrying not less than 154 lbs., etc., etc.

TORONTO.

1st. Moorehouse & Pepper, Toronto.
2nd. Grand & Co., Toronto.
3rd. Moorehouse & Pepper, Toronto.

Heavy Weight Qualified Hunters, carrying not less than 175 lbs., etc., etc.

TORONTO.

1st. Jas. Carruthers, Toronto, "Phyllis;" sire, Revolver.
2nd. F. A. Campbell, V.S., Toronto, "Glenora."
3rd. J. H. Reed, V.S., Guelph, "Duster;" sire, Henry Clay; dam, by Sir Latton Sykes.

Hunters showing best performance over successive jumps, 5 ft. catch weights, minimum weight 140 lbs., in and out, various heights.

TORONTO.

1st. Moorehouse & Pepper, Toronto.
2nd. Moorehouse & Pepper, Toronto.
3rd. F. A. Campbell, V.S., Toronto, "Glenora."

CLYDESDALES (IMPORTED OR CANADIAN BRED).—At London and Ottawa this class includes both Shires and Clydes.

Stallion, 4 years old and upwards.

TORONTO.

1st. Graham Bros., Claremont. "Macneilage," (imp.) [1117] (2992), brown, white face, one hind foot white, foaled June, 1882; bred by Wm Gray, Muncraig, Kirkcudbright, Scotland; imported Aug. 13th, 1889, by exhibitors; sire, Macgregor (1487); dam, Jess (1295), by Crown Prince, (207), etc.

2nd. R Beith & Co., Bowmanville, "Sir Walter" (imp.) [1131] (8 72); light brown, one fore foot and one hind foot white, stripe on face; foaled June 1st, 1885; imported 1889; bred by Jas. Crawford, Boreland, Castle Douglas, Scotland; sire, Bold Magbie (1 59); dam, Jean of Boreland, by Zulu, etc.

3rd. R Beith & Co., Bowmanville, "Paragon," (imp.) [1313] (7096), brown, ratch on face, one fore foot and one hind leg white; foaled May 2nd, 1885; imported Aug. 1889, by exhibitors; bred by Jas. Crawford, Boreland, Castle Douglas, Scotland; sire, Skelmorlie (4027); dam, Ivanhoe (4 27), by Ivanhoe (3 6), etc.

LONDON.

1st. Bean & Banting, Brinsley, "Maccombie," (imp.) [7 8] (4555) bay, stripe on face white hind feet, foaled May 21st, 1884; imported Aug., 1886; bred by Maxwell Clark, Culmain, Crocketford, Dumfries, Scotland; sire, Macgregor (1487); dam, Doll of Culmain (5), by Lochfergus Champion (449), etc.

2nd. O. J. & J. White, St. Marys, "Lord Russell," (imp.) [10 0] (6013), light brown, little white on one foot, foaled April 28th, 1886; imported in 1887; bred by John Young, Newton, Kilmalcolm, Scotland; sire, Jordanshaw (3343); dam, Jeanie Young (5885), by Druid (1120), etc.

3rd. A. Hughes, Kerwood.

OTTAWA.

1st. J. Clark, Ottawa.

2nd. A. T. White, Pembroke, "Peter the Great," (imp.) [267] (3381), light bay, ratch on face, white about feet, foaled in 1881; imported in 1885; bred by Jas. Dunlop, Campbelton, Ayrshire, Scotland; sire, King of the Forest (1170); dam, Maggie (34 2), by Largs Jock (444).

3rd. R. Ness, Howick, Que., "James Arthur," (imp.) [1374] (5 88), brown, stripe on face, one fore and one hind foot white, foaled May 10th, 1885; imported July 13th, 188 , by exhibitors; bred by M. Arthur, jr., Carlung, West Kilbride, Ayrshire, Scotland; sire, Macgregor (1487); dam, Tibbie II (4385), by Prince of Wales (673), etc.

Stallion, 3 years old.

TORONTO.

1st. R. Beith & Co., Bowmanville, Ont., "Eastfield Laddie" (imp.) [1127]: bay, white stripe on face, hind feet and part of legs white, near fore foot white; foaled May 2nd, 1887; imported 1889; bred by William Maxwell, Baraskomel, Campbelton, Scotland; sire, Old Times, (579); dam, Mary of Baraskomel (834), by Richard III. (1802), etc.

2nd. R Beith & Co., Bowmanville, Ont., "Eastfield Chief," (imp.) [1129]; bay, stripe on face, white fore ankles, hind legs white; foaled 1887; imported 1889; bred by Wm. Porter, Lochroon, Crossmichael, Scotland; sire, Prince Lawrence, Vol. VII., p. 261; dam, Belle of Lochroon (6624), by Lord Lyon (489), etc.

3rd. Graham Bros., Claremont, Ont., "Gilroy," (imp.) [130] (6787); dark brown, stripe on face, near fore foot and hind feet white; foaled May, 1887; imported Aug. 13th, 1889, by exhibitors; bred by Robt. Gilroy, Uppertown, Quothquhan, Biggar, Scotland; sire, Master of Blantyre (2283); dam, Maggie of Barnflat (3531), by Osman Pasha (17 7), etc.

LONDON.

1st. Nathan Norton, London, "Shamrock" (imp.) [1144] (7250), bay, ratch on face, four white legs; foaled May, 1887; imported by P. Curtin, Adare; sire, Ben Britain (3418); dam, Tibbie of Caldons (7613), by Glasgow Geordie (349), etc.

2nd. Jos. Begg, St. Thomas, "Royal Guinea," (imp.) (Vol. 12), dark bay, small stripe on face, white on off hind foot, nigh hind leg white; foaled May, 1887; imported in 1889; bred by John Laing, Crossford, Howward, Scotland; sire, Golden Guinea (3660); dam, Maggie of Crossford (8628), by Prince Albert (616), etc.

OTTAWA.

1st. Robt. Ness, Jr., Howick, Que., "Dandi Dinmont" (imp.) [1372] (7631); bay, ratch on face, off fore foot white, hind feet white; foaled May 25th, 1887, imported Aug. 4th., 1889, by exhibitor; bred by Trustees of late Hugh Bartholomew, Glenorchard Torrance of Campsie, Scotland; sire, Crown Royal, (4315); dam, Lily of the Valley, (3 3) by Prince Charley, (6 9); etc.

2nd. G. G. Stewart, Howick, Que., "Lord Oliphant" (imp.) (7975); bay, white spot on face white feet foaled May, 1887; imported Aug., 1889, by exhibitor; bred by Robt. Thompson, Burnbank, Blairdrummond, Scotland; sire, Grange, (671): dam, Jean of Burnbank, (5820) by Comet III, (193), etc.

Stallion, 2 years old.

TORONTO.

1st. Graham Bros., Claremont, "Second Choice" (imp.) [1431], (8214); bay, stripe on face, three dark feet with white mark above hoof on two feet, off hind foot white, foaled May, 1888; imported Aug., 1890, by exhibitor; bred by Mrs. Mary Stewart, Balliachrach, Rothesay, Scotland; sire, Chastler, (4291); dam, Jean by *St. Mungo*, by Prince of Wales (673), etc.

2nd. T. W. Evans Yelverton, "Rustic Lad" (imp.) [1599] (8218); bay, white face and hind legs, off fore foot and outside of leg white, near fore leg black, foaled May 9th., 1888, imported by exhibitor; bred by Mathew Taylor, Auchendolly, Dalbeattie, Scotland; sire, Knight of Lothian, (4489); dam, Jess of Auchendolly, (7985), by Galloway Lad, (3617), etc.

3rd. John Gilmour, Toronto, "Auchintoshan" (imp.) brown, off fore leg white, foaled June 22nd., 1888, imported by exhibitor; bred by Duncan Fraser, Auchintoshan, Duntocher, Scotland; sire, Lord Marmion, (6003); dam, Jane of Auchintoshan, (5396), by Black Prince, (1098), etc.

LONDON.

1st. O. J. & J. White, St. Marys, "Duke of Argyle" (imp.) [1449], (7330); dark brown, patch on face near hind leg white above ankle, foaled April 16th., 1888, imported Sept. 1890; bred by Robt. Russell, Ballymenach, Scotland, sire, Hazlewood, (7511); dam, Ballymenach Kate, by *Cromwell* by Prince of Wales, (673), etc.

2nd. P. Curtin, Centralia.

3rd. Jas Henderson, Belton, "Scotland's Pearl" (imp.) [1346] (8327); bay, patch on face, off fore foot and hind feet white, foaled May 1888, imported Sept. 1889; bred by John Wyllie, Mayfield, Stevenson, Scotland; sire, Lord Erskine, (1744); dam, Maggie of Mayfield, (5167), by Lorne (499), etc.

OTTAWA.

1st. R. Ness, Howick, Que., "Barlocco" (imp.) (7461); brown, star on face, hind feet white, foaled May 1st., 1888, imported in 1889, by exhibitor; bred by S. & R. Douglas, Barlocco, Borgue, Kirkcudbright, Scotland; sire, Macpherson (3825); dam, Maggie of Barlocco, (7170), by Victor (3362), etc.

2nd. G. G. Stewart, Howick, Que., "Thickallion" (imp.) Vol XIII, brown stripe on face, one fore foot and hind feet white, foaled May 21st., 1888, imported Aug., 26th. 1890; bred by Jas. Lindsay, Girdwoodend Carnwath, Scotland; sire, St. Clair Erskine, (4690); dam, Jessie Deans, (8651), by Prince Imperial (1259), etc.

3rd. T. Goodie, Richmond West, "Sir Walter" [937]; dark bay, small patch on face, hind feet white, foaled June 6th., 1887; bred by exhibitor; sire, Little Jock Elliott, (imp.) [936] (476); dam, Bell of Richmond, (imp.) [35], (3557), by Young Prince of Wales (3364), etc.

SPECIAL—OTTAWA.

Thoroughbred Clydesdale Stallion, 2 years old and over.

(Gold Medal by Ald. Hutchinson).—Diploma.

J. Clarke, Ottawa.

Yearling Colt entire.

TORONTO.

1st. John Gilmour, Toronto, "Lord Loval," (imp.).

2nd. Ormsby & Chapman, Springfield-on-the-Credit.

LONDON.

1st. Hugh Thompson, St. Marys, "McKnight" (imp.) (Vol. XIII); bay, stripe on face, four white feet foaled May 3rd, 1889; bred by Alex Keith, Chapelton Ellon, Scotland; sire, Bay Prince, (5528); dam, Love, (3332) by Dusty Miller (2), etc.

2nd. Hugh Thompson, St. Marys "Royal Ury" (imp.) (Vol. XIII); brown, stripe on face, hind feet white foaled June 20th., 1889, bred by Jas. Smith, Pittengardner, Fourdoun, Scotland; sire, Macaffer, (6028); dam, Lily of Pittengardner (4118), by Kier (424), etc.

OTTAWA.

1st. T. Carlyle, Chesterville, "John Dryden" [1512]; chestnut, white face, one fore foot white hind legs white, bred by exhibitor; sire Western Knight, (imp.) [1018] (6389); dam, Bella 2nd., of Dunbar (imp.) [458], by Baron Renfrew (57), etc.

Stallion any age.

TORONTO.

Graham Bros., Claremont, "Macneilage" (imp.) [1117] (2992).

LONDON.

Bean & Banting, Brinsley, "Maccombie" (imp.) [788] (4555).

Filly 3 years old.

TORONTO.

Graham Bros., Claremont, "Lady Dunmore" (imp.) [1321] ; light bay, little white on legs and face, foaled May 1887, imported Aug., 1890, by exhibitors, bred by Wm. Kerr, Bandeath Stirling, Scotland : sire, Earl Grange (4350) ; dam, Bandeath Fanny (8600), by Prince Charlie (634), etc.

3 Year old Filly or Gelding.

OTTAWA.

1st. T. Good, Richmond West, "Queen Vic" [410] ; bay, stripe on face, white feet, foaled May 30th., 1887, bred by exhibitor ; sire, The Montgomery, (imp.) [182] 2784 (3254) ; dam Bell of Richmond, (imp.) [36] (3527), by Young Prince of Wales (3364), etc.

2nd. J. G. Clark, Ottawa, "Independence,"

3rd. R Ness, Howick, Que., "Pansy" (imp.) (Vol. XII) ; light brown, white on face, foaled May 1887, imported in 1889, by exhibitor ; bred by J. Sibbals, Knowes, Linwood, Renfrew, Scotland ; sire, Laird O'Craigends (5129) ; dam, Bella (4096), by Ardgowan Prince (14), etc.

Filly, 2 years old.

TORONTO.

1st. Graham Bros., Claremont, "Barr Belle," (imp.) [1324], light bay, stripe on face, hind legs white, foaled May 7th, 1888 ; imported August, 1890, by exhibitors ; bred by R. Callandar, Upper Barr, Newton Stewart, Scotland ; sire, Barney (4829) ; dam, Barr Jean (3314), by Chancellor of Blackhall (1094), etc.

2nd. R. Beith & Co., Bowmanville, "Maria," (imp.) [979], dark bay, stripe on face, foaled in 1888 ; imported August, 1889, by exhibitors ; bred by Wm. McKinnell, Butterhole, Dalbeattie, Scotland : sire, Master of Blantyre (2283) ; dam, Nannie of Butterhole (4835), by Bob Burns (105), etc.

3rd. Graham Bros., Claremont, "Edith," (imp.) [1322], (Vol. XIII.), brown, star on face, little white on hind feet ; foaled May, 1888 ; imported August, 1890, by exhibitors ; bred by John Mark, Craigend Stow, Scotland ; sire, Lord Lyndoch (4530) ; dam, Rosie, Vol. XIII., by Culvennan Chief (2710), etc

LONDON.

1st. A. B. Scott & Son, Vanneck, "Primrose," [661], brown, small star on face ; foaled May 18th, 1888 ; bred by exhibitors ; sire, Maccombie, (imp.) [788] (4555) ; dam, Kate II of Congeith (imp.) [225], by Macgregor (1487), etc.

2nd. Geo. Spearin, St. Mary's, "Heather Queen," [1029], brown, stripe on face, foaled May 8th, 1888 ; imported in 1889 by O. J. & J. White, St. Mary's, Ont. ; bred by Thos. Lindsay Patrick, High Clunch, Fenwick, Scotland ; sire, Desdichado (4330) ; dam, Jenny of Clunch (6599), by Paisley Jock (581), etc.

OTTAWA.

1st. M. Tom, Aylmer.

2nd. R. Ness, Howick, Que., "Roseleaf," (imp.), Vol. XI., light bay, star on face, dark legs, foaled May 4th, 1888 ; imported in 1889 by exhibitor ; bred by Wm. McAdam, White Park, Castle Douglas, Scotland ; sire, Macbeth (3817) ; dam, Dainty of Whitepark (2588), by Prince (609), etc.

Yearling Filly or Gelding.

TORONTO.

1st. Graham Bros., Claremont, "Lady Muir," (imp.), bay, white face, three white legs, little white on inside of one hind foot, foaled Feb. 27th, 1889 ; imported August, 1890, by exhibitors ; bred by Wm. Muir, Lochdougan, Castle Douglas, Scotland ; sire, Darnley King (2717) ; dam, Gip (8910), by Glenamour (2128), etc.

2nd. Graham Bros , Claremont. "Sweetheart," (imp.) [1326], bay. white on face, hind legs white, foaled June, 1889 ; imported August, 1890 ; bred by W. Montgomery, Banks, Kirkcudbright, Scotland ; sire, Macgregor (1487) ; dam, My Sweetheart (8894), by Scots Wha Hae (4006), etc.
3rd. T. W. Evans, Yelverton, "Elsie Wood," (imp.).

London.

1st. A. B. Scott & Sons, Vanneck, "Jean Armour," [1085], brown, stripe on face, nigh hind foot white, foaled May 29th, 1889 ; bred by exhibitors ; sire, Good Kind (imp.) [1133] (2836) ; dam, Kate II of Congeith (imp.) [225], by Macgregor (1487), etc.

Ottawa.

1st. T. Carlyle, Chesterville, "Jean of Lowlands," [1438], dark brown, foaled April 19th, 1889 ; bred by exhibitor ; sire, Western Knight (imp.) [1018] (6389) ; dam, Rose of Kelvin (imp.) [1421], (Vol. VII.), by Darnley (222), etc.
2nd. R. Ness, Howick, Que., "Lady Banff," (imp.), Vol. XII., bay, stripe on face, hind feet white, foaled May 27th, 1889 ; imported by exhibitor in 1889 ; bred by Jas. Brown, Drummockloch, Gatehouse, Scotland ; sire, Knight of Banff (5115) ; dam, Moll of Drummockloch (8146), by Champion (2010), etc.

Brood Mare, with foal of same breed by her side.

Toronto.

1st. Hon. John Dryden, Brooklin, "Lady Clare," (imp.) [1337], bay, stripe on face, near hind foot white, foaled April 13th, 1882 ; imported in summer of 1883 by exhibitor ; bred by Amos Cruickshank, Sittyton, Starloch, Aberdeen, Scotland ; sire, Lorne II (1209) ; dam, Juliette (1161), by Glasgow Laddie (351), etc.
2nd. David McCloy, Chiselhurst, "Lady Clifton," (imp.), bay, black legs, foaled 1886 ; bred by Jas. Laird, Dibs, Kilmalcolm, Scotland ; sire, Jordonshaw (3343) ; dam, Jean of Dibs (7435), by Sovereign (1535), etc.
3rd. D. & R. McGeachy, Castlemore, "Polly McLatchie," (imp.) [339] (5583), light bay, stripe on face, white legs, foaled in 1877 ; imported in 1882 by exhibitors ; bred by Alex. Johnston, Machrihanish, Southend, Campbelton, Scotland ; sire, Doncaster (238) ; dam, Kate (3653), by Lord Clyde (2958), etc.

London.

1st. A. Hughes, Kerwood.

Ottawa.

1st. T. Carlyle, Chesterville, "Bella 2nd of Dunbar," (imp.) [468], bay, white face and white feet, foaled May, 1883 ; imported January, 1884 ; bred by Wm. Young, Herdshill Farm, Newmain's, Scotland ; sire, Baron Renfrew (37) ; dam, Bella of Herdshill (3139), by Czar (210), etc.
2nd. R. Robertson, Howick, Que., "Eliza Ann," (imp.), (Vol. X.), bay, foaled May, 1884 ; imported in 1886 by R. Ness, jr., Howick, Que. ; bred by Hugh Barr, Fearnoch, Scotland ; sire, Duchal (2737) ; dam, Lucy of Fearnoch (5926), by Jock of Hazeldean (407), etc.
3rd. R. Ness, Howick, Que., "Lady Newark," (imp.), (Vol. XI.,) bay, ratch on face, hind legs white, one fore foot white, foaled July, 1886 ; imported in 1888 by exhibitor ; bred by Jas. Andrew, Bushes' Farm, Paisley, Scotland ; sire, Lord Newark (4534) ; dam, Nellie of the Bushes (6925), by King of Kintyre (661), etc.

Foal of 1890.

Toronto.

1st. Hon. John Dryden, Brooklin, "Lady Gordon," [1338], bay, ratch on face, off fore leg and hind legs white ; foaled April 19th, 1890 ; bred by exhibitor ; sire, Tannahill (imp.) [1205] (3451) ; dam, Lady Clare (imp.) [1337] by Lorne II (1209), etc.
2nd. David McCloy, Chiselhurst.
3rd. D. & R. McGeachy, Coleraine.

London.

1st. D. Atcheson, St. Marys.
2nd. A. Hughes, Kerwood.

Ottawa.

st. T. Carlyle, Chesterville, bay ; foaled in 1890 ; bred by exhibitor ; sire, The Bard (imp.) [1357] (5391) ; dam, Bella II. of Dunbar (imp.) [468], by Baron Renfrew (37), etc.
nd. R. Robertson, Howick, Que., "Nellie of Burnside," light bay, ratch on face, hind feet white, off fore foot white, foaled June 16th, 1890, ; bred by exhibitor ; sire, James Arthur (imp.) [1374] (5888) ; dam, Eliza Ann (imp.) Vol. X., by Duchal (2737), etc.

3rd. R. Ness. Howick, Que., "Prince Arthur," bay, ratch on face, one hind foot white ; foaled June 14th 1890 ; bred by exhibitor ; sire, James Arthur (imp.) [1374] (5885) ; dam, Lady Newark (imp.) (Vol. XI.), by Lord Newark (4534), etc.

Mare with two of her progeny. (All to be bona fide property of the exhibitor.)

TORONTO.

1st. D. & R. McGeachy, Coleraine, "Maggie Chisken," (imp.) [367] (5585), dark brown ; foaled May, 1880 ; imported in 1882 by exhibitor ; bred by Archibald McKay, Liphenstrath, Southend, Campbelltown, Scotland ; sire, Farmer's Fancy (302) : dam, Jess (5592), by Prince Alfred (618).

Span of Clydesdales (Geldings or Mares).

TORONTO.

1st. Graham Bros., Claremont, "Harriett" (imp.) [1320], black, little white on face and hind pasterns ; foaled July 1st, 1886 ; imported Aug., 1890, by exhibitors ; bred by John Ritchie, Whitecastle, Biggar, Scotland ; sire, Young Glenlee (976) ; dam, Bell, *late* Maggie (1677), by Scotland Yet (757), etc. "Sally," (imp.) [1319], brown, white ratch on face, off hind foot white ; foaled in 1886 ; imported Aug., 1890, by exhibitor ; bred by Andrew Allan, Barkip, Dalry, Scotland ; sire, Prime of Life (2339) ; dam, Fanny, by Lochend Champion (448), etc.

OTTAWA.

1st. A. T. White, Pembroke, "Bell" (imp) [980], brown, white face and hind feet ; foaled in 1883 ; imported Aug., 1889 ; bred by D. McGibbon, Ardnacraig, Campbelton, Scotland ; sire, Sanquhar (2393) ; dam, Southinch Bell (6136), by Morton (546), etc. "Jenny Darnley," (imp.) [981], brown, ratch on face ; foaled in 1886 ; imported Aug., 1889 ; bred by Jas Greig, Goldenberry West, Kilbride, Scotland ; sire, *Kilbride* ; dam, Jenny Geddes (8468), by Darnley (222), etc.

2nd. R. Ness. Howick, Que., "Netty," (imp.) (7795), dark brown, star on face, little white on off hind foot ; foaled May, 1882 ; imported in 1885 ; bred by James Meiklem Shillingworth, Bridge of Weir, Scotland ; sire, Druid (1120) ; dam, Jess of Shillingworth (2518), by Darnley (222), etc. "Pansy," *see above.*

Best Mare, any age.

TORONTO.

1st. Graham Bros., Claremont, "Bessie Bell," (imp.) [1318] (7843).

LONDON.

A. B. Scott & Son, Vanneck, "Primrose" [661].

OTTAWA.

A. T. White, Pembroke, "Jenny Darnley," (imp.) [981].

SPECIAL PRIZES—CLYDESDALES.

For the best Imported or Canadian Bred Clydesdale Stallion, of any age, with five of his progeny, any age or sex.

TORONTO.

1st. Simon McKenzie, Brucefield, "Kenilworth," (imp.) [1441] (2187), dark brown, small stripe on face, three white feet ; foaled May, 1880 ; imported in 1882 by Wm. Colquhoun, Mitchell Ont. ; bred by And. Rankin, Midge's Croft, Airdrie, Lanarkshire, Scotland ; sire, Sir William (2419) ; dam, Maggie III. (1660), by Premier (595), etc.

2nd. D. & R. McGeachy, Coleraine "Nelson" (imp.) [341] (2301), light bay, white feet, stripe on face ; foaled July [illegible]th, 1881 ; imported July, 1883, by exhibitors ; bred by Andrew Fleming, Colla, Cornwath, Lanarkshire, Scotland ; sire, Another Day (1047) ; dam, Duchess (617), by Prince of Kilbride (660), etc.

OTTAWA.

Stallion, with three of his progeny under 1 year.

1st. T. Good, Richmond West, "Little Jock Elliot," (imp.) [936] (3768), dark bay, ratch on face, hind feet white ; foaled March 9th, 1883 ; imported Aug., 1886 ; bred by Geo. Rodger, Newton Bank, Preston Brook, Cheshire, England ; sire, Macgregor (1487) ; dam, Dawn of Mystery (2595), by Prince Charlie (629), etc.

SPECIAL SWEEPSTAKES FOR CLYDESDALES.

For the best Clydesdale Mare, any age, and one of her progeny, both the property of the exhibitor, and both to be recorded in the Clydesdale Stud Book of Canada.

TORONTO.

1st. Hon. John Dryden, Brooklin, "Lady Clare," (imp.), [337].

ENGLISH SHIRE HORSES (IMPORTED OR CANADIAN BRED.

Stallions, 4 years old and upward.

TORONTO.

1st. S. Hisey & Son, Creemore, "King Tom," (imp.), [107]; brown, stripe on face, three white legs, foaled in 1883 imported September, 1884, by John Donkin, Riverview; bred by Geo. Hudson, Cherry Burton, Eng.; sire, King Tom (2446); dam, Topper, by Lincoln *alias* Hercules (1350), etc.

2nd. Jas. Gardhouse & Sons, Highfield, "King of the Castle," (imp.), [71] (3171), brown, foaled in 1882, imported in 1883, by Chas. Harrison, York Mills; bred by Stephen Roberts, Mount Pleasant, Sibsey, Boston, Eng.; sire Honest Tom, (1111); dam, Smart, by Honest Tom, (3143), etc.

3rd. Morris, Stone & Wellington, Welland, "Chieftain II.," (imp.), [194] (5723); bay, blaze on face, nigh fore and hind feet white, foaled in 1884, imported in 1887 by exhibitor; bred by Wm. Riley, Boulton Derby, Eng; sire, Champion, (457); dam, mare by Waxwork, (2306), etc.

LONDON.

1st. Willis Bros., Hay, "Success II.," (imp.), [73] (6452); black, star on face, foaled in 1881, imported in October, 1884, by W. B. Fotheringham, Woodham; sire, Heart of Oak, (1010); dam, Rosy, by Honest Tom, (1097), etc.

Stallion, 3 years old.

TORONTO.

1st. Matthew Carlyle, Dunbar, "Cannock Dean," (imp.), [197] (6910), black, star on face, hind feet white, foaled in 1887, imported September, 1888, by exhibitors; bred by Edward Dean, Upton Mill, Chester, Eng; sire, Better Times, ([illegible]981); dam, mare by Marquis IV., (7065), etc.

2nd. Ormsby & Chapman, Springfield-on-the-Credit, "Leake Walker," (imp.), [205], brown, three white legs, foaled 1887, imported July, 1889, by exhibitors; bred by Jas. Roberts, High House, Heath, Chesterfield, Eng.; sire, Walker, (4143); dam, Fan, by Don Carlos, (2416), etc.

3rd. Morris, Stone & Wellington, Welland, "Active," (imp.), [152], brown, stripe on face, three white feet, foaled May 1st, 1887, imported in 1887 by exhibitors; bred by J. Naylor, Welchpool, Monts, Eng.; sire, Lincolnshire Lad II., (1365), dam, Lancashire Lass, by Honest Tom, (1105), etc.

Stallion, 2 years old.

TORONTO.

1st. Morris, Stone & Wellington, Welland, "Prince Charles," [197], bay, stripe on face, left hind and fore feet white, foaled in 1888, bred by exhibitors; sire, Carlton, (3523), dam, Lancashire Lass, by Honest Tom, (1105), etc.

2nd. Ormsby & Chapman, Springfield-on-the-Credit, "Leake Edward," (imp.), [207], black, foaled in 1883, imported July, 1889 by exhibitors; bred by Edward Shaw, Keyworth Notts, Eng.; sire, Carlton Comet, (5655); dam, Doll, by Bingham, (131).

3rd. Robert Hall, Edmonton.

Stallion, any age.

TORONTO.

1st. S. Hisey & Son, Creemore, "King Tom," (imp.), [107].

Filly, 2 years old.

TORONTO.

1st. J. G. Wardlaw, Downsview, "Emily May."

2nd. Ormsby & Chapman Springfield-on-the-Credit, "Leake Sally," (imp.), [67] bay, foaled in 1888, imported July, 1889, by exhibitors; bred by Alex. Crawford, West Leake Loughborough, Eng; sire, Leake Wonder, (6055); dam, Buxom, by Benefactor, (2334).

Brood Mare with foal of same breed by her side.

Toronto.

1st. Green Bros , Innerkip, "Georgia" (imp.) (Vol. X, F. S. B.) ; chestnut, foaled 1884, imported in 1888, by exhibitors ; bred by A. S. Gibson, Springhill, Bulwell, Notts, Eng., sire, Royal George II, (2485) ; dam, Glad Tidings (Vol V.) ; by William the Conqueror (2343).

2nd. J. G. Wardlaw, Downsview, "Hichin Diamond."

3rd. Morris, Stone & Wellington, Welland, "Lancashire Lass" (imp) [70] : bay, white face, left front and hind feet white, foaled in 1880, imported in 1887 by exhibitors ; bred by Thos. Howard, Preston Lane, Eng. , sire, Honest Tom (1105) ; dam, mare by Ploughboy, (1745).

Foal of 1890

Toronto.

1st J. G. Wardlaw, Downsview.

2nd. Morris, Stone & Wellington, Welland, "Stanley" [197] ; black, white face, front feet white, foaled in 1890 bred by exhibitors ; sire, Chieftain II, (imp.) [194] (5723) ; dam, Lancashire Lass, (imp.) [70], by Honest Tom, (1105), etc.

3rd. Green Bros., Innerkip.

Mare with two of her progeny

Toronto.

1st. Morris, Stone & Wellington, Welland, "Lancashire Lass" (imp.) [70] ; bay, white face. left front and hind feet white, foaled in 1880, imported in 1887 by exhibitors ; bred by Thos. Howard, Preston Lane, Eng. ; sire, Honest Tom, (1150) ; dam, mare by Ploughboy, (1745).

Best Mare any Age.

Toronto.

Green Bros., Innerkip, "Georgia" (imp.) (Vol. X, E. S. B.).

SPECIAL PRIZES—ENGLISH SHIRE HORSES (IMPORTED OR CANADIAN BRED).

Shire Stallion, any age, with five of his progeny, any age or sex.

1st. Jas. Gardhouse & Sons, Highfield, "King of the Castle" (imp.) [71] (3171) ; brown, foaled in 1882, imported in 1882 by Chas. Harrison, York Mills ; bred by Stephen Roberts, Mount Pleasant, Sibsey Boston, Eng., sire, Honest Tom (1111) ; dam, Smart by Honest Tom, (3143), etc.

HEAVY DRAUGHT HORSES (CANADIAN BRED ONLY.)

Stallion, 4 years old and upwards.

Toronto.

1st. R. C. Gibson, Arthur, "The Macgregor."

2nd. Jas. McFarlane, Jr., Claremont, "Sandy Macgregor," —191— bay. stripe on face, black mane and tail ; foaled Aug. 24th, 1886 ; bred by D. S. McFarlane, Claremont ; sire Alexander Macgregor (imp) [113] ; dam, Nettie. of Springbank Farm —258—, by Garfield (imp.) —83—, etc.

3rd. John Park, Oriel, "Gold Cup."

Stallion, 3 years old and upwards.

London.

1st. S. McKenzie, Brucefield, "General Scott," bay, star on forehead, hind feet white ; foaled April 14th, 1887 ; bred by exhibitor : sire, Kenilworth (imp.) [1441] (2187) ; dam, Mag, by Count Careless (imp) [41] (1421), etc.

Stallion, 3 years old.

Toronto.

1st. Peter Kelly, Jr., Brechin, "Pride of Dollar" [962], bay, stripe on face, nigh hind foot white ; foaled May 6th, 1887 ; bred by Wm. Cox, Thornhill ; sire, Pride of Perth (imp.) [282] (2336) ; dam, Sally of Thornhill [328], by Sir Wm. Wallace imp.) [123].

2nd. S. McKenzie, Brucefield.

3rd. Jno. Roach, Yorkville, "Belford."

Stallion, 2 years old.

TORONTO.

1st. John L. Howard, Sutton West, "Argyle."

2nd. John Cox, L'Amaroux, "Dunboy," [1426], bay, white face, hind feet white; foaled May 14th, 1888; bred by John Cox & Son, L'Amaroux; sire, Campsie Lad (imp.) [344] (4277); dam, Blossom [153], by Modern Type (imp.) [25], etc.

3rd. Wm. Crawford, Brown's Corners, "Success," [1311], brown, star on face, off hind foot white, little white on nigh hind foot, foaled June 15th, 1888; bred by exhibitor; sire Pride of Perth, (imp.) [282] 2264 [2336], dam Malvern Jennie [579] 165, by Young Broomfield, (imp.), [211] 73, etc.

LONDON.

1st. W. A. Cunningham, Carlow, "Young Lord," [R87], bay, small star on face, little white on one hind foot, foaled May 16th, 1888; bred by Jas. Govier, Auburn, Ont.; sire Lord of the Manor (imp.) [1155] (2933); dam Upshall by Real Mackay (1801).

2nd. Geo. Taylor, Kippen, "Red Ribbon," bay, white face, hind legs and one fore foot white, foaled May, 1888; bred by Geo. Hart, Brucefield; sire Kenilworth (imp.) [1441] (2187), dam Doll by *Lord Aberdeen*, etc.

3rd. Robt. Robson, Birr.

Yearling Colt, entire.

TORONTO.

1st. D. & R. McGeachy, Coleraine, "Castlemore".

2nd. Robt. McCowan, Scarboro.

3rd. Prouse & Williamson, Ingersoll, "Lochiel," (imp.) [1140], brown, white on face, hind legs white, foaled June 6th, 1889; imported in dam July, 1888, by T. W. Evans, Yelverton; bred by John McIlwraith, Meadowhead, Coylton, Ayrshire, Scotland; sire, Hatton's Pride (imp.) [1006] (6830); dam, Coylton Maid (imp.) [794], by Gold (3657), etc.

LONDON.

1st. Prouse & Williamson, Ingersol, "Lochiel," (imp.) [1140]. (See above, Toronto.)

2nd. A. Hughes, Kerwood.

Heavy Draught Stallion, any age.

TORONTO.

1st. Peter Kelly, jr., Brechin, "Pride of Dollar," [962].

LONDON.

1st. W. A. Cunningham, Carlow, "Young Lord," [R 87].

Filly, 3 years old.

TORONTO.

1st. D. & R. McGeachy, Coleraine, "Mary of Castlemore," [618], light bay, star on forehead, stripe on nose, foaled May 23rd, 1887; bred by exhibitors; sire, Nelson (imp.) [341] 2301); dam, Polly McLatchie (imp.) [339] (5583), by Doncaster (238), etc.

2nd. W. J. McDermott, Living Spring, "Jennie," [1302], bay, small star on face, hind feet white, foaled May 24th, 1887; bred by exhibitors; sire, Boydston Boy (imp.) [216] 1872 (111); dam, Lucy [1301], by Ontario Chief (imp.) [155] 398 (1776), etc.

3 year old Gelding or Filly.

OTTAWA.

1st. N. Boyd, Manotick.

2nd. J. E. Clark, Ottawa.

3rd. J. Kemp, Hazeldean, mare by Windsor (imp.), dam by Robby Bruce.

Filly, 2 years old.

TORONTO.

1st. Thos. Glendenning, L'Amaroux, "Elsie," [1350], bay, stripe on face, little white on off hind foot, foaled April 22nd, 1888; bred by Robt. McCowan, jr., Scarboro'; sire, Self Esteem (imp.) [377] (5344); dam, Kate Tabor —132—, by Young Broomfield (imp.) [211] (73), etc.

2nd. S. McKenzie, Brucefield, "Nora."
3rd. R. N. Ewers, Manchester, "Dolly," [1096], bay, stripe on face, little white on hind feet, foaled June 2nd, 1888; bred by exhibitor; sire, Lawer's Baron Gordon (imp.) [1005] 4594 (5736); dam, Minnie, by Young Chancellor (imp.) [171] 910 (1868), etc.

LONDON.

1st. A. B. Carr, Westfield, "Young Wawanost Queen," chestnut, stripe on face, foaled April 14th, 1888; bred by exhibitor; sire, Lord of the Manor (imp.) [1155] (2971); dam, Nellie, by What's Wanted (imp.) [47] (914), etc.
2nd. Geo. Taylor, Kippen, "Countess of Thornpark," —340—, bay, stripe on face, hind feet white, foaled June 28th, 1888; bred by Geo. Taylor, Kippen; sire, Stranraer (imp.) [162] C. C. B. (2441); dam, Pay When Ready, by Welcome (imp.) [338] C. C. B. (904), etc.
3rd. Wm. Cornish, Winchester.

2 year old Gelding or Filly.

OTTAWA.

1st. G. Smith, Leitrim.
2nd. J. Clark, Ottawa.
3rd. R. Rerington, Merivale.

Yearling Filly or Gelding.

TORONTO.

1st. R. W. Ewers, Manchester, "Bell of Peach," [1097], bay, stripe on face, little white on feet, foaled April 16th, 1889; bred by exhibitor; sire, Lawer's Baron Gordon (imp.) [1005] 4594 (5136); dam, Minnie, by Young Chancellor (imp.) [171] 910 (1868), etc.
2nd. Wm. Foster, Humber.
3rd. Willis Bros., Pine Grove, "Princess Beatrice."

LONDON.

1st. Geo. Wood, Avonton.
2nd. Heider & Parker, Oxford Centre.

OTTAWA.

1st. T. Todd, Richmond, "Lady Elliot;" sire, Little Jock Elliot, (imp.), [936] (3768); dam, Kate, by Sir Wm. Wallace, (imp.), [11] (806), etc.
2nd. R. Allan, Hull, Que.
3rd. J. Johnson, Leitrim.

Brood Mare with Foal of same breed by her side.

TORONTO.

1st. Jno. Cox, L'Amaroux, "Blossom" [153]; bay, stripe on face, foaled May, 1882, bred by John Cox & Son, L'Amaroux, sire, Modern Type, (imp.), [25]; dam, Jenny Cox, [136], by Scotsman, (imp.), [1 6], 154, etc.
2nd. Henry H. Boag, Queensville, "Bonnie B." —326—; bay, white face, one hind foot white, foaled May, 1882; bred by James A. Boag, Queensville; sire, Sir James, (imp.), [167]; dam, Bonnie, by Dundonald, (imp.) [351], 381, (256), etc.
3rd. Jno. Bone, Edgeley, "Bet of Edgeley," [621]; brown, stripe on face, four white legs, foaled April 28th, 1885; bred by John Bone, Edgeley; sire, Dandy Jim (imp.), [239] 2748 (3271); dam, Fanny, of Victoria Square, by Marquis, (imp.), [247] 32 (5 7), etc.

LONDON.

1st. Heider & Parker, Oxford Centre.
2nd. Geo. Wood, Avonton.
3rd. A. Hughes, Kerwood.

OTTAWA.

1st. J. Todd, Richmond, "Kate;" foaled May 3rd, 1885; bred by exhibitor; sire, Sir Wm. Wallace, (imp.), [11] (1806); dam, Jennie, by Heather Jock.
2nd. R. Allan, Hull.
3rd. J. Johnson, Leitrim.

Foal of 1890.

TORONTO.

1st. Robt. Davies, Toronto.
2nd. Robt. McGowan, Scarboro.
3rd. Jas. Gardhouse & Son, Highfield.

LONDON.

1st. Prouse & Williamson, Ingersoll.
2nd. Heider & Parker Oxford Centre.

Mare with two of her progeny, all to be bona fide property of exhibitor.

TORONTO.

1st. Jno. Cox, L'Amaroux, "Blossom," [153].

Span of Heavy Draught Horses, Geldings or Mares.

TORONTO.

1st. John L. Howard, Sutton West, "Jessie," [953], 2205; dark bay, white face, right hind foot white, silver tail, foaled June 27th 1884, bred by exhibitor; sire, Rob the Ranter, (imp.), [249], 1168, (1803), dam, Dolly Varden Second, [320], 671, by Wait-a-wee (imp.), [274] 759 (1549), etc. "Bonnie," [951], bay, star on face grey tail, foaled April, 1884, bred by J. R Boucher, Sutton West; sire, Rob the Router, (imp.), [429] 1168 (1803); dam, Prout mare, by Young Broomfield, (imp.), [211] 73.
2nd. Wm. Foster, Humber, "Nettie of Castlemore."
3rd. Riverside Storage Cartage Co., Detroit, "Alger" and "Captain."

LONDON.

1st. Geo Spearin, St. Marys, "Jessie;" grey, foaled 1883, bred by exhibitor; sire, Highland Chief, (imp) [84] 226 (382); dam, mare by Old Lord Haddo, (imp.), [49] (3872 etc. and "Darling," [915]; bay, stripe on face, one fore foot white, foaled May 10th, 1887, bred by exhibitor; sire, Laird O'Urie, (imp), [615] (172-); dam, by Highland Chief, (imp), [84] 226 (382), etc.

Mare of any age.

TORONTO.

1st. Jno. Cox, L'Amaroux, "Blossom," [153].

LONDON.

1st. Geo. Spearin, St. Marys, "Jessie."

OTTAWA.

1st. J. Kemp, Hazledean, mare; sire, Windsor, (imp.), dam, by Robby Bruce.

SUFFOLK PUNCH HORSES, IMPORTED OR BRED FROM PURE IMPORTED STOCK.

Stallion, 3 years old and upwards.

TORONTO.

1st. Jos. Beck, Thorndale, "Enterprise, (1934); sire, Stormer, (1628); dam, Brag.
2nd. J. A. Melvin, Winchester, "Bunker's Boy," (imp.,) (1912), ; sire, The Bunker; dam, Matchet Q.
3rd. A. & J. W. Salmon, Thorndale, "Invader," (1430); sire, Commodore, (1482); dam, Rose, (235).

Stallion, 4 years old and upwards.

LONDON.

1st. A. & J. W. Salmon, Thorndale, "Invader," (1430). (See above, Toronto).

Stallions, 4 years old and upward.

OTTAWA.

1st. J. A. Melvin, Winchester.
2nd. J. Fletcher, Oxford Mills, "Duke of May," (1621).

Stallion, 3 years old.

LONDON.

1st. Jos. Beck, Thorndale, "Enterprise," (imp.), (1934); sire, Stormer, (1628); dam, Brag.

Stallion, 2 years old.

Toronto.

1st. Jos. Storey, Winchester, "Captain William," (1993).

London.

1st. A. & J. W. Salmon, Thorndale, "Vivacity," (2027); sire, Invader, (1439); dam, Violet, (2338).

Yearling Colt.

Toronto.

1st. A. & J. W. Salmon, Thorndale, "Vivacity," (2027); sire, Invader, (1439); dam, Violet, (2338).

Stallion, any age.

Toronto.

1st. Jos. Beck, Thorndale, "Enterprise" (1934).

Ottawa.

1st. J. A. Melvin, Winchester.

Mare, 3 years old and upwards.

Toronto.

1st. Mossom, Boyd & Co., Bobcaygeon, "Blossom;" sire, Cupbearer; dam, Blossom.

Filly, 2 years old.

Toronto.

1st. Mossom, Boyd & Co., Bobcaygeon, "Maud;" sire, Invader, (1439); dam, Vanity, (1630).
2nd. Mossom, Boyd & Co., Bobcaygeon, "Primrose," (1439); sire, Invader; dam, Patch, (1536).

London.

1st. A. & J. W. Salmon, Thorndale, "Vixen," (2363); sire, Welby, (1428); dam, Violet, (2338).

Yearling Filly or Gelding.

Toronto.

1st. Mossom, Boyd & Co., Bobcaygeon, "Princess;" sire, Invader, (1439); dam, Patch, (1536).

Brood Mare, with Foal of the same breed by her side.

Toronto.

1st. Thos. Irving, Winchester, "Baroness," (imp.,) (1320): sire, Royalty, (1339): dam, Brilliant, (1061).
2nd. Jos. Beck, Thorndale, "Vanity," (imp.,) (1630); sire, Cupbearer III.; dam, Venture, (922).

London.

1st. Jos. Beck, Thorndale, "Vanity," (1630); sire, Cupbearer III., (566); dam, Venture, (922).
2nd. Jos. Beck, Thorndale, "Patch," (1536): sire, Chieftain, (1354); dam, Pearl, (918).

Ottawa.

1st. A. Hagar, Plantagenet.

Foal of 1890.

Toronto.

1st. Jos. Beck, Thorndale, "Duke of Thorndale," (2159): sire, Invader, (1439): dam, Vanity, (1630).
2nd. Thos. Irving, Winchester, "Fashion;" sire, Frolic, (1616; dam, Baroness, 1320).

London.

1st. Jos. Beck, Thorndale, "Duke of Thorndale." (See above, Toronto).
2nd. Jos. Beck, Thorndale, "Perfection of Thorndale, 2178); sire, Invader, (1439); dam, Patch, (1536).

Matched Team, (Geldings or Mares) in Harness.

Toronto.

1st. Snider & Edmonton, Brantford, "Princess," (imp.,) (2209) ; sire, Wilson's Banker, (1444) ; dam, Smart, (1019). "Victoria," (imp.,) (2206) ; sire, Wilson's Banker, (1444) : dam, Doughty, (1024).

Mare, any age.

Toronto.

1st. Mossom, Boyd & Co., Bobcaygeon, "Maud ;" sire, Invader, (1439) ; dam, Vanity, (1630).

PERCHERONS, OR FRENCH DRAUGHT HORSES.

Stallion, 3 years old and upwards.

Toronto.

1st. Haras National Co., Montreal, "Joly," (15168) ; sire, Myrama, (15166) ; dam, Garote, (15167).
2nd. W. E. Baker, Demorestville, "Brilliant," (8390) ; sire, Cardino ; dam, Roas.
3rd. Haras National Co., Montreal, "Bontemps," (20828) ; sire, Coco, (5754) ; dam, Coquette, (17923).

London.

1st. Haras National Co., Montreal, "Joly," (15168). (See above, Toronto).
2nd. Haras National Co., Montreal, "Boom, (32171) ; sire, Vaillant, (2380) ; dam, Curtesaine, (5685).

Ottawa.

1st. Campbell & Dobbie, La Chute Mills, Que, "Clodius, (20084).
2nd. W. & R. Bell, Mosgrove.

Stallion, 2 years old.

Toronto.

1st. W. E. Baker, Demorestville, "Cæsar ;" sire, Productor ; dam, Roas.

London.

1st. P. Whilihan, St. Mary s, "Marshall McMahon ;" sire, Prince of Normandy, (2710) 8355 ; dam, Maud, (2711) 8358, etc.

Yearling Colt.

Toronto.

1st. W. E. Baker, Demorestville, "M. W. Dunham ;" sire, Condino ; dam, Roas.

London.

1st. P. Whilihan, St. Marys, "Black Colt ; sire, Napoleon, (2712) ; dam, Dilly or Lilly, (2708) 8356, etc.
2nd. P. Whilihan, St. Marys, "Grey Colt ;" sire, Duke of Normandy, (2709 : dam, Maud, (2711) 8358, etc.

Stallion, any age.

Toronto.

1st. Haras National Co., Montreal, "Joly," (15168).

London.

1st. Haras National Co., Montreal, "Joly," (15168).

Ottawa.

1st. Campbell & Dobbie, LaChute Mills, Que., "Clodius," (20084).

Mare, 3 years old and upwards.

Toronto.

1st. W. E. Baker, Demorestville, "Roas," (imp.,) (1542) (2771) ; sire, Madeiri ; dam, Fannie.

3 year old Gelding or Filly.

OTTAWA.

1st. P. McIntosh, Cass Bridge.

2 year old Gelding or Filly

OTTAWA.

1st. P. McIntosh, Cass Bridge.

Brood Mare with foal of same breed by her side.

LONDON.

1st. P. Whilihan, St. Mary's, "Dilly or Lilly," (2708) 8356; sire, Brilliant, (756); dam, Margot, (561), etc.

OTTAWA.

1st. P. McIntosh, Cass Bridge.

Foal of 1890.

LONDON.

1st. P. Whilihan, St. Mary's, "Colt;" sire, Prince of Normandy, (2710) 8355; dam, Dilly or Lilly, (2708) 8306, etc.
2nd. P. Whilihan, St. Mary's, "Colt;" sire, Prince of Normandy, (2710) 8355; dam, Maud, (2708) 8356, etc.

OTTAWA.

1st. P. McIntosh, Cass Bridge,

Mare, any age.

TORONTO.

1st. W. E. Baker, Demorestville, "Roas," (1542).

LONDON.

1st. P. Whilihan, St. Mary's, "Dilly or Lilly, (2703) 8356.

OTTAWA.

1st. P. McIntosh, Cass Bridge.

HACKNEY STALLION.

Best Imported Hackney Stallion, any age.

TORONTO.

1st. Asa Choate, Port Hope, "Norfolk Hero," (imp.), (515); sire, Perfection, 543.
2nd. Geo. H. Hastings, Deer Park, "Young Nobleman. (2328); sire, Confidence, (158); dam, by Washington. (852)
3rd. Matthew Carlyle, Dunbar, "Bounding Willow, (1997).

LONDON.

1st. Jos. Beck, Thorndale, "Sir Garnet;" sire, Guardsman, (1492); dam, by Robin Hood, (677).
2nd. Jos. Beck, Thorndale, "Perfection, (2777); sire, Fireaway, (265); dam, Polly, (2356).

OTTAWA.

1st. Matthew Carlyle, Dunbar, "Bounding Willow, (1997).

CATTLE.

SHORT HORNS.

Bull, 4 years old and upwards.

TORONTO.

1st. J. & W. Russell, Richmond Hill, Ont., "Stanley," =8538=; dark roan, calved June 23rd, 1885; bred by Joseph Redmond, Peterboro, got by Challenge, =2933=; dam, Wimple 16th, (imp.) =5 34= by British Flag, (16[illegible]09), etc.
2nd. Jas. Leask, Taunton "Deacon" =10530=; red, with white feet, calved Feb. 25th, 1883, bred by H. H. Spencer, Brooklin, got by Vensgarth, (imp.), =1309= (47192); dam, Isabella 3rd, =6369=, by Fidget's Oxford 8th =631= etc.

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3 years old and upwards.

LONDON.

1st. Thos. Ballantyne & Sons, Stratford, "Prince Royal," (imp.) =3418= (53340); red and white calved Jan. 5th, 18 7, imported in 18 7 by John Dryden, Brooklin bred by E. Cruickshank, Lethenty, Aberdeenshire, Scotland, got by Prince Rufus, (51 26); dam, Primrose, (imp.) =5191= by Third Duke of Carolina, (41364), etc.

2nd. H. Snell & Sons, Clinton, "Vice Consul," (8 51); red, calved March 8th, 1886, bred by S. C. Isaac, Baltimore, got by Neptune, (imp.), =2724=; dam, Ruby Hill 12th, =1895=, by Golden Crown, (imp.), =114=, etc

3rd. R. & S. Nicholson, Sylvan "Warrior," (imp), =4153= (55173); red, calved Jan. 10th, 18 5, bred by S. Campbell, Kinellar, Scotland; imported in 188 by Arthur Johnston, Greenwood, got by Vermont, (47195); dam, Maid of Promise, Vol. 31, by Shuttlecock, (35520), etc.

Bull 2 years old and under 3.

TORONTO.

1st. T. Nelson & Sons, Bow Park, Brantford Ont,., "Master Ingram," =8329=; roan, calved Nov. 0th, 18 7, bred by the exhibitors, got by Sir Arthur Ingram =3574=; dam, Havering Nonpareil 2nd, (imp.) =5133= by Baron Gwynne 2nd, (44 50).

2nd. Robert Davies, Toronto, "Northern Light," (imp.) (57 01); red, calved March 17th, 1883, bred by A. Cruickshank, Sittyton, Aberdeen, Scotland, got by Standard Bearer, (5006); dam, Nonpareil 20th, by Cumberland, (46144), etc.

3rd. Wm. Chisholm, Brisbane, Gladstone 2nd =10526= ; red, calved Dec. 6th, 1887, bred by Alex. Burns, Rockwood; sire, Gladstone, =4983= ; dam, Daisy Dean =5761= by Jacob Bright =1917= etc.

LONDON.

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Master Ingram =8329=. (See above, Toronto).

2nd. James Oke & Sons, Alvinston, "Ironclad."

3rd. Jas. Milne, White Oak.

OTTAWA.

1st. J. & W. Russell, Richmond Hill, "Windsor," (imp.) =6456=, red calved Jan 30th, 1887, imported in 1887; bred by S. Campbell, Kinellar, Aberdeen Scotland, got by Gravesend, (46461) dam, Red Bess, by Gladstone, (4328) etc.

2nd. A T. Waite, Pembroke, "Victor Hubert," =11350=, dark roan, calved April 6th, 1888, bred by Arthur Johnston, Greenwood, got by Royal Victor, (imp.) =4120=, dam, Victoria 60th, (imp.) =52 0=, by Achilles (40951) etc.

3rd. J. & W. Russell, Richmond Hill, "Stanley," *alias* Oliver Mowat, =7949=, dark roan, calved June 23rd, 1 8 ; bred by Jos. Redmond, Peterboro', got by Challenge =2933=, dam, Wimple 15th, (imp.) =5231=, by British Flag (46009), etc.

Bull, 1 year old.

TORONTO.

1st. Eastwood Bros., Mimico, "Cromwell," =11792=, roan, calved, Jan. 4th 1889; bred by R. & S. Nicholson, Sylvan, got by Warrior, (imp.) =4133= (5173), dam, Vacuna 11th, =14038=, by Prince Albert, =3669=, etc.

2nd, Thos. Nelson & Sons, Bow Park, Brantford, "Roan Duke 29th," red and white, calved March 9th, 1889; bred by exhibitors, got by Sir Arthur Ingram, =3574=, dam Roan Duchess of Oxford, =7695=, by Fifth Lord Oxford, =3157= (738), etc.

3rd. Jno. Currie Everton, "War Eagle," =13015=, red, calved June 27th 1889; bred by A. Johnston, Greenwood got by Warfare (imp.) =6452= dam Daisy's Star, =114 9= by Duke of Lavender (imp.) =1243= (51135).

LONDON.

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Roan Duke 29th." (See above, Toronto.

2nd. Thos Russell, Exeter, "Grey Mariner," =12012=, dark roan, calved Oct. 2nd, 1888; bred by exhibitor, got by Mariner, (imp.) =2720=, dam, Jane Grey, =9527=, by Prince of Strathblane, =3727=, etc.

3rd. Geo. Dickie, Hyde Park, "Roan Oak," =12741=, roan, calved Oct. 19th, 1888; bred by exhibitor, got by Scottish Victor, (imp.) =2739= (50422) dam, Mary White, =17009=, by Sir Massey, =6020=, etc.

OTTAWA.

1st. J. Forth & Son, Glen Buell, "Defiance."
2nd. Thos. Graham, Bell's Corners, "Lansdowne," =12022=, red, calved March 1st, 1889; bred by exhibitor, got by Baron 3rd, =9334=, dam, Magnet, =7035=, by Viscount, =1141=, etc.
3rd. J. G. Clark, Ottawa.

Bull calf under 1 year.

TORONTO.

1st. R. & S. Nicholson, Sylvan, "Valasco XV., =13470=, roan, calved Oct. 2nd, 1889; bred by exhibitors, got by Warrior, (imp,) =4133= (55173) dam, Vacuna 13th =14738=, by Prince Albert =3669=, etc.
2nd. Thos. Ballantyne & Son, Stratford, "Indian Prince," =13014=, red, calved Sept. 3rd 1889; bred by A. Johnston, Greenwood, got by Indian Chief, (imp.) = = dam, Nonpareil of Kinellar, (imp.) =8314=, by Luminary, =35715=, etc.
3rd. Jno. Miller & Sons, Brougham, Strathroy.

LONDON.

1st. R. & S. Nicholson, Sylvan.
2nd. Thos. Ballantyne & Sons, Stratford, "Indian Prince," =13014=, red, calved Sept. 3rd, 1889; bred by Arthur Johnson, Greenwood, got by Indian Chief, (imp.), dam, Nonpareil of Kinellar (imp.) =8314=, by Luminary, =34715=, etc.
3rd. H. & W. Smith, Hay, "Village Hero," =14342=red, calved Dec. 13th 1889; bred by exhibitors, got by Prince Albert, =3669=, dam, Village Blossom, (imp.) =2277=, by Ben Wyvis, (30528) etc.

OTTAWA.

1st. J. & W. Russell, Richmond Hill, "Ury Lad," =14257=, red, calved Dec. 1889; bred by Geo. Isaac, Bomanton, sire Gen. Booth, (imp.), =54353=, dam Ury Maid, (imp.)
2nd. W. C. Edwards & Co., Rockland.
3rd. D. McPhail, Vernon, "Cassio," =13458= red and white, calved Feb. 16th 1890; bred by exhibitor, got by Athelstane, =5207= dam, Vernon Maid, =13347= by Waterloo Warder, (imp.) =1315=, etc.

Bull, any age.

TORONTO.

Thos. Nelson & Sons, Bow Park, Brantford, "Master Ingram," =8329=.

LONDON.

Thos. Nelson & Sons, Bow Park, Brantford, "Master Ingram," =8329=.

OTTAWA.

J. & W. Russell, Richmond Hill, "Windsor," (imp.) =6456=.

Cow, 4 years old and upwards.

TORONTO.

1st. T. Nelson & Sons, Bow Park, Brantford, "Isabella II," (imp.) =8283=, white, calved July 9th, 1885: bred by J. Outhwaite, Bainesse, Cotterick, Yorkshire, Eng., imported by exhibitors in 1885, got by Lord Zetland, (43596) d. Lady Isabel, (imp.) =5156=, by Crown Prince (38061) etc.
2nd. T. Nelson & Sons, Bow Park, Brantford, "Lady Oxford Waterloo V," roan, calved April 17th, 1887; bred by the exhibitors, got by Viscount Oxford, of Elmhurst, (48892) d. Waterloo Belle, by Wild Duke III., (42611) etc.
3rd. J. & W. Russell, Richmond Hill, "Mina Lenton," =12544=, roan, calved Oct. 25th 1885; bred by J. Isaac, Markham, got by Baron Lenton, (imp.), =1222= (49081) d. Mina of Aberdeen, (imp.), =11058=, by Gladstone, (43286) etc.

LONDON.

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Lady Oxford Waterloo V," (See above, Toronto.)

2nd. Thos. Nelson & Sons, Bow Park, Brantford, "Isabella II.," (imp.) =8283=. (See above, Toronto.)

3rd. R. & S. Nicholson, Sylvan, "Maid of Sylvan XI., =12391=, white, calved Oct. 27th, 1885; bred by Thos. Nicholson & Sons, Sylvan, got by Prince Albert, =3669=, dam, Sixth Maid of Sylvan, =7060=, by Prince Royal, =2290=, etc.

Cow, 3 years old and upwards.

OTTAWA.

1st. J. & W. Russell, Richmond Hill, "Roan Princess," (imp) =11075= roan, calved Feb. 26th, 1885, imported in 1887 by exhibitors; bred by G. Inglis, Newmore, Invergorden, Scotland, got by Star of the West, (48789) dam, Vail Princess, (vol. 31, p. 472, E.H.B.) by Windsor Vail, (44273) etc.
2nd. W. C. Edwards & Co., Rockland, Belinda.
3rd. J. & W. Russell, Richmond Hill, "Mina Lenton," =12544=. (See above, Toronto.)

Cow, 3 years old.

TORONTO.

1st. T. Nelson & Sons, Bow Park, Brantford, "Isabella III." = =, roan, calved October 3rd, 1886; bred by exhibitors, got by Ingram's Chief, (imp.), =2704=, dam, Lady Isabella, (imp.), =5156=, by Crown Prince (38061), etc.
2nd. J. & W. B. Watt, Salem, "Mildred III." =15022=, roan, calved June 15th, 1887; bred by Jas. Redmond, Peterborough, got by Challenge =2933=, dam, Minnie *alias* Mildred (imp.), =5175=, by Gladstone (43286), etc.

LONDON.

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Isabella III." = =. (See above, Toronto.)
2nd. R. & S. Nicholson, Sylvan, "Baroness Stanley II." =14735=, red, calved Sept. 10th, 1886; bred by exhibitors, got by Prince Albert =3669=, dam, Baroness Stanley =2400=, by Baron Stanley =1400=, etc.

Heifer, 2 years old.

TORONTO.

1st. T. Nelson & Sons, Bow Park, Brantford, "Lady Aberdeen 9th" = =, calved Dec. 25th, 1887; bred by exhibitors, got by Ingram's Chief, (imp.), =2704=, dam, Lady Aberdeen 5th, =9407=, by 2nd Prince of Springwood, =978=, etc.
2nd. J. & W. Russell, Richmond Hill, "Roseabel."
3rd. Thos. Nelson & Sons, Bow Park, Brantford, "Julia 24th" = =, red and little white, calved January 10th, 1888; bred by exhibitors, got by Oscar = =, dam, Julia's Baronness (imp.) =5143=, by Baron Shendish Fifth (44374).

LONDON.

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Julia 24th" = =. (See above, Toronto.)
2nd. Thos. Nelson & Sons, Bow Park, Brantford, "Lady Aberdeen 9th" = =. (See above, Toronto.)
3rd. H. Snell & Sons, Clinton, "Daisy 2nd" =16325=, roan, calved March 18th, 1888; bred by exhibitors, got by Vice-Consul, =8061=, dam, Daisy, =8788=, by Captain Merlin =2923=, etc.

OTTAWA.

1st. J. & W. Russell, Richmond Hill, "Rosabel," =16022=, red, calved Nov. 5th, 1887; bred by John Isaac, Markham, got by Baron Lenton, (imp.), =1222=, dam, Mina of Aberdeen, (imp.), =11058=.
2nd. Duncan McLaren, Dunmore, "Verbena Primrose" =18235=, roan, calved Dec. 18th 1888; bred by Arthur Johnston, Greenwood, got by Primrose Duke (imp.) =6414=, dam, Verbena 13th, =8086=, by 2nd Duke of Pickering =557=, etc.
3rd. J. & W. Russell, Richmond Hill, "Rose of Autumn 9th," =16059=, red, calved Jan. 5th 1888; bred by exhibitors, got by Prince =3666=, dam, Rose of Autumn 7th, =7811=.

Heifer, 1 year old.

TORONTO.

1st. J. & W. B. Watt, Salem, "Matchless 8th" = =, roan, calved Oct. 12th, 1888; bred by exhibitors, got by Barmpton Hero, =324=, dam, Matchless of Elmhurst 2nd, =3883=, by Baron Louan 3rd =338=, etc.
2nd. J. & W. Russell, Richmond Hill, "Royal Princess."
3rd. Thos. Nelson & Sons, Bow Park, Brantford, "Isabella V." = =, white, calved in 1889; bred by exhibitors, got by Ingram's Chief, =2704=, dam, Isabella III., = =, by Ingram's Chief, =2704=, etc.

LONDON

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Isabella 5th" = =. (See above, Toronto.)

2nd. H. & W. Smith, Hay, "Village Flower," =16865=, red, calved January 20th, 1889; bred by exhibitors, got by Prince Albert =3669=, dam, Village Blossom, (imp.), =2277=, by Ben Wyvis (30528), etc.

3rd. R. & S. Nicholson, Sylvan, "9th Leonore of Elmdale" = =, red and white, calved Feb. 19th, 1889; bred by exhibitors, got by Warrior (imp.) =4133=, (55173), dam 7th Leonore of Elmdale =14736=, by Prince Albert =3669=, etc.

OTTAWA.

1st. J. & W. Russell, Richmond Hill, "Royal Princess" = =, red, calved Sept. 2nd, 1888; bred by exhibitors, got by Gen. Booth, (imp.), =6365=, dam, Roan Princess, (imp.), =11075=, by Star of the West (48789), etc.

2nd. J. & W. Russell, Richmond Hill, "Nonpareil's Victoria," =17139=, red, calved Sept. 7th, 1888; bred by Arthur Johnston, Greenwood, sire, Vice-Consul, =4142=, dam, Nonpareil of Kinellar, (imp.), =8314=.

3rd. W. C. Edwards & Co., Rockland, "Bountiful."

Heifer, calf under 1 year.

TORONTO.

1st. J. & W. B. Watt, Salem, "Matchless 9th."

2nd. J. &. W. Russell, Richmond Hill, "Queen Mary."

3rd. Thos. Ballantyne & Sons, Stratford, "Sixth Missie of Neidpath," = = roan, calved Sept. 13th, 1889; bred by exhibitors, got by Prince Royal, (imp.) =6418=, (56349), dam, Missie 81st, (imp.), =5180=, by Bentick (42787), etc.

LONDON.

1st. Thos. Ballantyne & Sons, Stratford, "Sixth Missie of Neidpath," = =. (See above, Toronto.)

2nd. Thos. Ballantyne & Sons, Stratford, "Meadowsweet 3rd" = =, roan, calved Dec. 11th, 1889; bred by exhibitors, got by Prince Royal (imp.) =6418=, dam, Meadowsweet (imp.) =11054=, by Lanchester (46594), etc.

3rd. Simmons & Quirie, Delaware and Ivan.

OTTAWA.

1st. J. &. W. Russell, Richmond Hill, "Queen Mary" = =, dark roan, calved Oct. 20th, 1889; bred by exhibitors, got by Stanley =7949=, dam, Roan Princess (imp.) =11075=, by Star of the West (48789), etc.

2nd. J. & W. Russell, Richmond Hill, "Gipsy Lady" = =, dark roan, bred by exhibitors, got by Windsor, (imp.), = =, dam, Gipsy Queen, (imp.), =5130=.

3rd. W. C. Edwards & Co., Rockland.

Four Calves, under 1 year old, owned and bred by exhibitor.

TORONTO.

1st. R. & S. Nicholson, Sylvan.

2nd. Jno. Miller & Sons, Brougham.

3rd. J. & W. Russell, Richmond Hill.

Herd, consisting of 1 bull and 4 females over 1 year old, owned by the exhibitor.

TORONTO.

1st. Thos. Nelson & Sons, Bow Park, Brantford.

2nd. J. & W. Russell, Richmond Hill.

3rd. Robt. Davies, Toronto.

LONDON.

1st. Thos. Nelson & Sons, Bow Park, Brantford.

2nd. R. & S. Nicholson, Sylvan.

OTTAWA.

1st. J. & W. Russell, Richmond Hill.

2nd. W. C. Edwards & Co., Rockland.

3rd. Thos. Graham, Bell's Corners.

Female, any age.

TORONTO.

1st. Thos. Nelson & Sons, Bow Park, Brantford, "Lady Oxford Waterloo."

HEREFORDS.

Bull, 3 years ald and upwards.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Cassio," (imp.), 11353; calved Aug 8th, 1881, bred by P. Turner, The Seen, Eng.; sire. The Grove 3rd, (2490); dam, Duchess 2nd, (11384), by Spartan, (3978), etc.

2nd. E. W. Judah, Hillhurst, Que., "Duke of Chadner," 23117.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Cassio," (imp.), 11353. (See above, Toronto).

2 years old and upwards.

OTTAWA.

1st. E. W. Judah, Hillhurst, Que., "Duke of Chadner, 23117. (See above, Toronto).

Bull, 2 years old.

TORONTO.

1st. F. A. Fleming, Weston, Ont., "Wilton Hillhurst," 36125; calved Feb. 19th, 1888; bred by Hon. M. H. Cochrane, Hillhurst, Que.; sire, Ottoman, 29783; dam, Jessonda, 11357, by Cassio, 11353, etc.

LONDON.

1st: F. A. Fleming, Weston, "Wilton Hillhurst, 36125. (See above, Toronto).

Bull, 1 year old.

TORONTO.

1st. F. A. Fleming, Weston, "Lisle Grove," 36819; sire, Earl Downton; dam, Lily Grove.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Vendex," Vol. 12; calved Aug. 27th, 1889, bred by exhibitor; sire, Ellengton, 32945; dam, Vanity 2nd, 23121, by Cassio, (imp.), 11353 (6849), etc.

2nd. F. A. Fleming, Weston, "Lisle Grove," 36819. (See above, Toronto).

Bull Calf, under 1 year.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Otto Wilton," Vol. 12; calved Nov. 21st, 1889, bred by exhibitor; sire, Ottoman, (imp), 29783 (10364); dam, Jessonda 2nd, 30311, by Marshall Grove, 16944, etc.

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Count Cassius," Vol. 12; calved Sept. 4th, 1889, bred by exhibitor: sire, Cassio, (imp.) 11353 (6849); dam, Alpine, 21371, by Attila, 17915, etc.

3rd. F. A. Fleming, Weston, "Lilac."

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Otto Wilton," Vol. 12. (See above, Toronto).

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Count Cassius," Vol. 12. (See above, Toronto).

Bull, any age.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Cassio," (imp.) 11353 (6849).

London.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Cassio," (imp.) 11353 (6849).

Ottawa.

1st. E. W. Judah, Hillhurst, Que., "Duke of Chadner," 23117.

Cow, 4 years old and upwards.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Pandora," (imp.), Vol. 17; calved Jan. 16th, 1885, bred by J. Price, Court House; sire, Monarch 20001 (7848); dam, Peerless, by Regulus, 3849, etc.

2nd. F. A. Fleming, Weston, "Lily 6th," (imp.), 23833; calved April 6th, 1883, bred by A. Partridge, Discoyd, Eng.; sire, Delight, 23834; dam, Lily 2nd, (21172), by Latitude, 21176, etc.

3rd. F. A. Fleming, Weston, "Miss Broady," (imp.), 23852; calved May 16th, 1882, bred by A. R. Broughton, Knight Downton Castle, Eng.: sire, Downton Grand Duke, (4182); dam, Broady 9th, (23853), by Alphonso, (9961), etc.

London.

1st Hon. M. H. Cochrane, Hillhurst, Que., "Pandora," (imp.), Vol. 17. (See above, Toronto).

2nd. F. A. Fleming, Weston, "Lily 6th, (23833). (See above, Toronto).

3 years old and upwards.

Ottawa.

1st. E. W. Judah, Hillhurst, Que., "Lowland Lass," 24768.

2nd. E. W. Judah, Hillhurst, Que., "Stella," 34233.

Cow, 3 years old.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Eastern Empress," 28860, calved Sept. 12th, 1886; bred by the exhibitor, sire Cassio, 11353, dam, Empress 3rd, 11318, by the Grove, 2490.

2nd. F. A. Fleming, Weston, Ont., "Miss Broady 2nd," 26399, calved May 11th, 1886; bred by exhibitor, sire, Auctioneer, 9572, dam Miss Broady, 23852, by Downton Grand Duke, 4182, etc.

3rd. E. W. Judah, Hillhurst, Que.

London.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Eastern Empress," 28860. (See above, Toronto.)

2nd. F. A. Fleming, Weston, "Miss Broady 3rd." 33485.

Heifer, 2 years old.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Vanity 3rd," 36124, calved Oct. 19th, 1887; bred by the exhibitor, sire, Cassio (imp.), 11353, dam Vanity, 11346, by the Grove 3rd (2490) etc.

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Young Queen 3rd," 36126, calved Feb. 28th, 1888; bred by the exhibitor, sire, Cassio. (imp.), 11353, dam Young Princess 3rd, 11327, by Monlins, 8116, etc.

3rd. F. A. Fleming, Weston, Ont., "Lily Wilton," 36818, calved Feb. 13th, 1888; bred by exhibitor, sire, Conqueror 2nd, 19425, dam, Lily 6th, 23833, by Delight, 23834, etc.

London.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Vanity 3rd. 36124, (See above, Toronto.)

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Young Queen 3rd," 36126. (See above, Toronto.)

Ottawa.

1st. E. W. Judah, Hillhurst, Que., "Zita," 34235.

Heifer, 1 year old.

TORONTO.

1st. E. W. Judah, Hillhurst, Que., "Bertha."
2nd. F. A. Fleming, Weston, Ont., "Lady Dot," 36816, calved Oct. 18th, 1888; bred by exhibitor, sire, Earl Downton, 12797, dam Lady Downton, 17530, by Downton Boy, 4434, etc.
3rd. E. W. Judah, Hillhurst, Que., "Lowland Lady," Vol. X. A.H.B.

LONDON.

1st. F. A. Fleming, Weston, "Lady Dot" 36816, (See above, Toronto.)
2nd. F. A. Fleming, Weston, "Barbara 2nd." 36808.

OTTAWA.

1st. E. W. Judah, Hillhurst, Que., "Bertha," Vol. X. A.H B.
2nd. E. W. Judah, Hillhurst, Que., "Lowland Lady," Vol, X A.H.B.

Heifer Calf, under 1 year.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Rosa of Hillhurst," Vol. 12, calved Sept. 25th, 1889; bred by exhibitor, sire, Marshall Grove, 16944, dam, Rosa, 29782, by Monarch, 20001, etc.
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Empress of Sherbrooke."
3rd. F. A. Fleming, Weston, "Miss Rose."

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Empress Frederick," Vol XII; bred by exhibitor, sire, Ellington (32945), dam, Eastern Empress, 28860, by Cassio, (imp)., 11353, etc.
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Rosa of Hillhurst," Vol. XII, (See above Toronto.

OTTAWA.

1st. E. W. Judah, Hillhurst, Que.

Herd consisting of 1 bull and four females, over 1 year old, owned by the exhibitor.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que.
2nd. F. A. Fleming, Weston.
3rd. E. W. Judah, Hillhurst, Que.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que.

OTTAWA.

1st. E. W. Judah, Hillhurst Que.

Female, any age.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Vanity 3rd," 36124.

SPECIAL PRIZES FOR PURE BRED HEREFORDS.

Best pair yearling heifers.

TORONTO.

1st. E. W. Judah, Hillhurst, Que.
2nd. F. A. Fleming, Weston.

Best pair heifer calves, under 1 year old.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Empress of Sherbrooke." "Rosa of Hillhurst."
2nd. F. A. Fleming, Weston.
3rd. E. W. Judah, Hillhurst, Que., "Agnes." "Dorothy."

POLLED ANGUS.

Bull, 3 years old and upwards.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lord Hillhurst," 3990 (3961), calved Feb. 2nd, 1884 ; bred by the exhibitor ; sire, Paris Herd (1163), dam, Lady Ida 2nd (1920), by Gavenwood (1444), etc.

London.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lord Hillhurst," 3990 (3961). (See above, Toronto.)

2nd. Wm. Stewart & Son, Lucas, "President," 4871.

2 years old and upwards.

Ottawa.

1st. Robt. Craik, M.D., Montreal, "Favour," 9770.

Bull, 2 years old.

Toronto.

1st. Robt. Craik, M.D., Montreal, "Favour."

Bull, 1 year old.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Jacques Cartier," Vol. IV., calved Aug. 6th, 1889 ; bred by the exhibitor ; sire, Lord Hillhurst, 3990 (3961), dam, Jean X. 3931, by Keillor, 233.

2nd. Robt. Craik, M.D., Montreal, "Baronial Prince," 10918.

London.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Jacques Cartier," Vol. IV. (See above, Toronto.)

2nd. Wm. Stewart & Son., Lucas, "Morchall," (11493).

Ottawa.

1st. Robt. Craik, M.D., Montreal, "Baronial Prince," 10918. (See above, Toronto.)

Bull Calf, under one year.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lord Forest," Vol. IV., calved Dec. 2nd, 1889 ; bred by exhibitor ; sire, Lord Advocate, 6954, dam, Lady Ida Forbes, 6919, by Lord Hillhurst, 3990 (3961), etc.

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Britomart," Vol. IV., calved Oct. 8th, 1889 ; bred by exhibitor ; sire, Lord Advocate, 6954, dam, British Bud, 6942, by Paris 3rd, 1163, etc.

3rd. Robt. Craik, M.D., Montreal.

London.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lord Forest," Vol. IV. (See above, Toronto.)

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Britomart," Vol. IV. (See above, Toronto.)

Ottawa.

1st. Robt. Craik, M.D., Montreal, "Favorius," 12902.

2nd. Robt. Craik, M.D., Montreal, "Faverly," 12901.

Bull, any age.

Toronto.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lord Hillhurst," 3990 (3961).

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lord Hillhurst," 3990 (3961).

OTTAWA.

1st. Robt. Craik, M.D., Montreal, "Baronal Princess," 10918.

Cow, 4 years old and upwards.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lady Ida Forbes," 6919; calved April 2nd, 1886, bred by the exhibitor; sire, Lord Hillhurst, 3990 (3961); dam, Lady Hillhurst Forbes, 3911, by Paris 3rd, 1163, etc.
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Bonny Maid," 6937; calved March 26th, 1886, bred by the exhibitor; sire, Lord Hillhurst, 3990 (3961); dam, Bonny Bee, 3878, by Braes O'Gight, 3295, etc.
3rd. Hon. M. H. Cochrane, Hillhurst, Que., "Ruth's Favorite," (imp.), 8038; calved Dec. 2nd, 1884, bred by W. Anderson, Scotland; sire Wedgewood, (2123); dam, Friendship, (5164), by Knight of the Shire, (846), etc.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lady Ida Forbes," 6919. (See above, Toronto).
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Bonny Maid," 6937. (See above, Toronto).

Cow, 3 years old and upwards.

OTTAWA.

1st. Robt. Craik, M.D., Montreal, "Fairy A. of Eastview," 7776.
2nd. Robt. Craik, M.D., Montreal, "Fanny of Ardgowan, 6512.
3rd. Robt. Craik, M.D., Montreal, "Princess Victoria, 4020, (5522).

Cow, 3 years old.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Jeanette," 6932; calved Sept. 26th, 1886, bred by the exhibitor; sire, Paris 3rd, 1163; dam, Jean 10th, 3931, by Keillor, 233, etc.,
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Valentia," 8044; calved Feb. 17th, 1887, bred by the exhibitor; sire, Lord Hillhurst, 3990 (3961); dam, Vine of Skene, 3947, by His Lordship, 1495, etc.
3rd. Robt. Craik, M.D., Montreal, Que., "Ardgowan Favorite."

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Jeanette," 6932. (See above, Toronto).
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Valentia," 8044. (See above, Toronto).

Heifer 2 years old.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Beauty's Queen," 9399; calved Feb. 17th, 1888, bred by the exhibitor; sire, Paris 3rd, 1163; dam, Beauty of Glamis, 3934, by Elchies, 552, etc.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Beauty's Queen," 9399. (See above, Toronto).
2nd. Wm. Stewart & Sons, Lucas, "Hilda," 8759.

Heifer, 1 year old.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Primrose of Hillhurst," 11749.
2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Lady Ida of Paris 2nd, 11683.
3rd. Hon. M. H. Cochrane, Hillhurst, Que., "Lady Forbes of Compton," 11115.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Lady Forbes of Compton," 11115. (See above, Toronto).

2nd. Hon. M. H. Cochrane, Hillhurst, Que,, "Primrose of Hillhurst," 11749. (See above, Toronto).

OTTAWA.

1st. Robt. Craik, M.D., Montreal, "Nanette 6th, 10917.

Heifer Calf, under 1 year.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Junia," 12898.

2nd. Hon. M. H. Cochrane, Hillhurst, Que., "Lady Flora Forbes," Vol. IV.; calved Oct. 16th, 1889. bred by exhibitor; sire, Lord Hillhurst, 3990, (3961); dam, Young Lady Forbes, Vol 2nd, 1105, by Duke of Eastboro, 1103, etc.

3rd. Dr. Craik, Montreal.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Junia, 12898. (See above, Toronto).

2nd. Hon. M. H. Cochrane, Hillhurst, Que,, "Lady Flora Forbes," Vol. IV. (See above, Toronto).

OTTAWA.

1st, Robt. Craik M.D., Montreal, "Fay," 12904.

Herd, consisting of 1 Bull and 4 Females, over 1 year old, owned by the exhibitor.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que.

2nd. do do

3rd. Robt. Craik, M.D., Montreal.

LONDON.

1st. Hon. M. H. Cochrane, Hillhurst, Que.

OTTAWA.

1st. Robt. Craik, M.D., Montreal.

Female, any age.

TORONTO.

1st. Hon. M. H. Cochrane, Hillhurst, Que., "Jeanetta," 6932.

GALLOWAYS.

Bull, 3 years old and upwards.

TORONTO.

1st. Wm. Kough, Owen Sound, "Claverhouse," (imp.), (4250) 4614 sire, Crusader (2858), dam. Topsy (4146).

2nd. Thos. McCrae, Guelph, "Stanley II." O.E.F., (imp.,) (4473), 2837, sire, Stanley III. (1793), dam, Bertha of Drumlanrig (4222).

3rd. Thos. McCrae, Guelph, "Count Palatine" (imp.), (4508) 5883, sire, Crusader (2858), dam, Cantatrice (5569).

LONDON.

1st. Wm. Kough, Owen Sound, "Claverhouse." (See above, Toronto.)

2 years old and upwards.

OTTAWA.

1st. Thos. McCrae, Guelph, "Stanley II." O.E F. (imp.) (4473), 2837. (See above, Toronto.)

2nd Thos McCrae, Guelph, "Count Palatine' (imp) (4508) 5883. (See above, Toronto.)

3rd. Thos. McCrae, Guelph, "Canadian Borderer" 5945, sire, Scottish Borderer (669), dam, Lizzie VII. of Torabreach (8935), etc.

Bull, 2 years old.

TORONTO.

1st. Thos. McCrae, Guelph, "Glencraig" 5028, sire, Stanley II., O.E.F. (imp.) (4473) 2837, dam, Belted Lass (557).

2nd. Thos. McCrae, Guelph, "Canadian Borderer," (imp.), 5945, sire, Scottish Borderer (669), Lizzie VII. (8935.)

Bull, 1 year old.

TORONTO.

1st. Wm. Kough, Owen Sound, "Marseilles" 6120, sire, Claverhouse (imp.) (4250) 4614, dam, Miss Steele II. 3452.

2nd. Thos. McCrae, Guelph, "Glengarry" 6423, sire, Stanley II. O.E.F. (imp.) (4473) 2837, dam, Good Girl, 7431.

3rd. Thos. McCrae, Guelph, "Squire Porter," 6765, sire, Current Coin, 4037, dam, Lady Constance II., 9571.

LONDON.

1st. Wm. Kough, Owen Sound, "Marseilles" 6120. (See above, Toronto).

OTTAWA.

1st. Thos. McCrae, Guelph, "Norfolk" 6764, sire, Black Ronald (4326), dam, Netty of Chapelhill (8840), etc.

2nd. Thos. McCrae, Guelph, "Saladin" 6762, sire, Royal Prince (4401) dam, Semiramis XIX. (9609).

Bull Calf under 1 year.

TORONTO.

1st. Wm. Kough, Owen Sound, "Dan of Claverhouse" (6589), sire, Claverhouse (imp.) (4250) 4614, dam, Rachel (665).

2nd. Wm. Kough, Owen Sound, "Guy of Claverhouse" 6638, sire, Claverhouse (imp.) (4250) 4614, dam, Countess of Glencairn (9501).

3rd. Thos. McCrae, Guelph, "Algoma" sire, Chinaman 4154, dam, Good Queen Bess, 10512.

LONDON.

1st. Wm. Kough, Owen Sound, "Guy of Claverhouse" (6638). (See above, Toronto).

2nd. Wm. Kough, Owen Sound, "Dan of Claverhouse" (6589). (See above, Toronto).

OTTAWA.

1st. Thos. McCrae, Guelph, "Algoma" 7375. (See above, Toronto).

2nd. Thos. McCrae, Guelph, "Marmion" (7376), sire, Stanley II. O.E.F. (imp.) (4473) 2837, dam, Violet III. of Tarbreoch (9675), etc.

Bull, any age.

TORONTO.

1st. Wm. Kough, Owen Sound "Claverhouse" (imp.) 4250 (4614).

LONDON.

1st. Wm. Kough, Owen Sound, "Claverhouse" (imp.) 4250 (4614).

OTTAWA.

1st. Thos. McCrae, Guelph. "Stanley II. O.E.F. (imp.) (4473), 2837.

Cow, 4 years old and upwards.

TORONTO.

1st. Wm. Kough, Owen Sound, "Countess of Glencairn," (imp.) (9501) 4617, sire, Rover of Newtonairds (2742), dam, Bertha of Newtonairds (9514).

2nd. Thos. McCrae, Guelph, "Queen V. of Drumlanrig," (imp.) (9579) 5911, sire, Netherlea, 3335, dam, Queen III., 4013.

3rd. Thos. McCrae, Guelph, "Good Girl," 7431, (imp.,) sire, Baliol, 1475, dam, Eva, 2844.

LONDON.

1st. Wm. Kough, Owen Sound, "Countess of Glencairn" (imp.) (9501) 4617. (See above, Toronto.)

2nd. Wm Kough, Owen Sound, "Rachael" 665, sire, Lord Chelmsford 521, dam, Border Belle, 522.

Cow, 3 years old and upwards.

OTTAWA.

1st. Thos. McCrae, Guelph, "Violet III. of Tarbreoch" (9675), 5916, sire, Scottish Borderer (669), dam, Maid III. (3437), etc.

2nd. Thos. McCrae, Guelph, "Carline" (imp.) (10515) 5932, sire, Blackamore (1175), dam, Susan II. (8573), etc.

3rd. Thos. McCrae, Guelph, "Queen V. of Drumlanrig" (imp), (9579) 5911. (See above, Toronto).

Cow, 3 years old.

TORONTO.

1st. Thos. McCrae, Guelph, "Carline" (imp.), (10515) 5932. (See above, Toronto).

2nd. Wm. Kough, Owen Sound, "Mary V. 3600, sire, Creochs (673), dam, Mary (524) 3291.

3rd. Thos. McCrae, Guelph, "Countess of Arran" 10505, (imp.,) sire, Court Card 4036, dam, Laura, 8208.

LONDON.

1st. Wm. Kough, Owen Sound, "Mary V." 3600. (See above, Toronto).

Heifer, 2 years old.

TORONTO.

1st. Wm. Kough, Owen Sound, "Miss Steele V." 4248, sire, Creochs (673), dam, Miss Steele II. 3452.

2nd. Thos. McCrae, Guelph, "Hannah B. of Guelph" (11080), 5226, sire, Stanley II. O.E.F. 4473, dam, Hannah III. 7699.

3rd. Thos. McCrae, Guelph, "Queenie of Guelph," 5736, sire, The Cob, 4167, dam, Idle Queen 10507).

LONDON,

1st. Wm. Kough, Owen Sound, "Miss Steele V." 4248. (See above, Toronto).

OTTAWA.

1st. Thos. McCrae, Guelph, "Hannah B. of Guelph," (11080) 5026. (See above, Toronto).

2nd. Thos. McCrae, Guelph, "Queenie of Guelph," 5736. (See above, Toronto).

3rd. Thos. McCrae, Guelph, "Columbine," 5934; sire, Current Coin (4037); dam, Netty of Chapelhill (8840), etc.

Heifer, 1 year old.

TORONTO.

1st. Wm. Kough, Owen Sound, "Countess of Glencairn III.," 6116; sire, Claverhouse (imp.) (4250), 4614; dam, Countess of Glencairn (9501).

2nd. Thos. McCrae, Guelph, "Ranee IX.," 5937; sire, Black Crusader, 4504; dam, Ranee IV., 5544.

3rd. Thos. McCrae, Guelph, "Dunara," 6770; sire, Stanley II., O.E.F., 4473; dam, Lizzie VII., 8935.

LONDON.

1st. Wm. Kough, Owen Sound, "Countess of Glencairn III., 6116. (See above, Toronto).

2nd. Wm. Kough, Owen Sound, "Countess of Galloway III.," 6413; sire, Claverhouse, (4250) 4614; dam, Countess of Galloway II. (10089).

OTTAWA.

1st. Thos. McCrae, Guelph, "Ranee IX.," 5937. (See above, Toronto).

2nd. Thos. McCrae, Guelph, "Dunara," 6770. (See above, Toronto).

Heifer Calf, under 1 year.

TORONTO.

1st. Wm. Kough, Owen Sound, "Countess of Galloway III.," 6413 ; sire, Claverhouse (imp.) (4250) 4614 ; dam, Countess Galloway II. (10039).
2nd. Wm. Kough, Owen Sound, "Mary VI.," 6415 ; sire, Claverhouse (imp.) (4250) 4614 ; dam, Mary 524 3291.
3rd. Wm. Kough, Owen Sound, "Agnes K. III." 6586 ; sire, Claverhouse (imp.) (4250) 4614 ; dam, Agnes of Egremont 777.

LONDON.

1st. Wm. Kough, Owen Sound, "Mary VI.," 6415. (See above, Toronto.)
2nd. Wm. Kough, Owen Sound, "Agnes K. III.," 6586. (See above, Toronto.)

OTTAWA.

1st. Thos. McCrae, Guelph, "Hanney C., of Guelph," 6775 ; sire Chinaman (4154) ; dam, Hannah A. of Guelph (10532), etc.
2nd. Thos. McCrae, Guelph, "Lady Gladys," 7377 ; sire, Stanley II., O.E.F. (4473) ; dam, Belted Lass, 557, etc.

Herd, consisting of 1 Bull and 4 Females, over 1 year and owned by the exhibitor.

TORONTO.

1st. Wm. Kough, Owen Sound.
2nd. Thos. McCrae, Guelph.

LONDON.

1st. Wm. Kough, Owen Sound.

OTTAWA.

1st. Thos. McCrae, Guelph.
2nd. Thos McCrae, Guelph.

Female, any age.

TORONTO.

1st. Wm. Kough, Owen Sound, "Countess of Glencairn III.," 6116.

DEVONS.

Bull, 3 years old and upwards.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Young Ensign," [925] ; calved April 4th, 1884, bred by Robt. Oliver Priceville ; sire, Red Tom, [831] ; dam, Isabella, [656], by Hartland, [363], etc.
2nd. Samuel Harper, Cobourg, "Brigham, [948] ; calved Sept. 26th, 1886, bred by exhibitor ; sire, Mike, [920] ; dam, Rose of Cobourg, [897], by Garibaldi II., [717], etc.

Bull, 2 years old and upwards.

OTTAWA.

1st. Chas. Mohr, Bell's Corners, Ont.
2nd. W. J. Rudd, Eden Mills, "Young Ensign, [925]. (See above, Toronto).

Bull, 2 years old.

TORONTO.

1st. Samuel Harper, Cobourg, "Buffalo Jack," [955] ; calved March 1st 1888, bred by exhibitor sire, Mike, [920] ; dam, Annie, [922], by Sir Walter, [843], etc.

Bull, 1 year old.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Hero," [982] ; calved March 20th, 1889, bred by exhibitor, sire, Rose's Duke, (imp.) [929] ; dam, Beauty, [800], by Kempenfelt, [719], etc.
2nd. Samuel Harper, Cobourg, "Noah ;" sire, Luther, [931] ; dam, Polly Perkins.
3rd. W. J. Rudd, Eden Mills, "Captain," [984] ; calved March 10th, 1889, bred by exhibitor ; sire, Lansdowne, [933] ; dam, Lady Creamer, [929], by Marquis II., [871], etc.

OTTAWA.

1st. W. J. Rudd, Eden Mills, "Hero," [982]. (See above, Toronto).
2nd. W. J. Rudd, Eden Mills, "Captain," [984]. (See above, Toronto).

Bull Calf, under 1 year.

TORONTO.

1st. Samuel Harper, Cobourg, "George ;" sire, Luther, [931] ; dam, Sally, [923].

Bull, any age.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Young Ensign," [925].

OTTAWA.

1st. W. J. Rudd, Eden Mills, "Hero," [982].

Cow, 4 years old and upwards.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Rose," [849] ; calved May 22nd, 1881, bred by John Howes ; sire, King of the Ocean, [727] ; dam, Blue Bell, [343], by Samson VI., [310], etc..
2nd. W. J. Rudd, Eden Mills, "Esmeralda O.E.F.," [936] ; calved March 26th, 1886, bred by the Ontario Experimental Farm. Guelph ; sire, Rose's Duke, [929] ; dam, Esmerelda, (imp.) [928], by Chancellor, (1047), etc.
3rd. Samuel Harper, Cobourg, "Lucy," [931] ; calved June 2nd, 1885, bred by exhibitor ; sire, Sir Walter, [843] ; dam, Lady Dufferin, [728], by Garibaldi II., [717], etc.

Cow, 3 years old and upwards.

OTTAWA.

1st. W. J. Rudd, Eden Mills, "Esmerelda O.E.F.," [936]. (See above, Toronto).
2nd. W. J. Rudd, Eden Mills, "Rose," [849]. (See above, Toronto).
3rd. W. J. Rudd, Eden Mills, "Dido," [951] ; calved May 20th, 1887, bred by exhibitor ; sire, Victor, [884] ; dam, Beauty, [800], by Kempenfelt, [719], etc.

Cow, three years old.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Rene," [952] ; calved April 20th, 1887, bred by exhibitor ; sire, Victor, [884] ; dam, Rose, [849], by King of the Ocean, [727], etc.
2nd. W. J. Rudd, Eden Mills, "Dido," [951]. (See above, Ottawa).
3rd. Samuel Harper, Cobourg, "Susan," [955] ; calved April 1st, 1887, bred by exhibitor : sire, Mike, [920] ; dam, Lizzy, [894], by Garibaldi II., [717], etc.

Heifer, 2 years old.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Frances," [962] ; calved March 10th, 1888, bred by exhibitor ; sire, Lord Lansdowne, [933] ; dam, Red Rose, [890], by Professor, [847], etc.
2nd. W. J. Rudd, Eden Mills, "Effie," [963] ; calved June 2nd, 1888, bred by exhibitor ; sire, Lord Lansdowne [933] ; dam, Linda May, [714.] by Sir Walter, [614], etc.
3rd. W. J. Rudd, Eden Mills, "Ethel," [961]. calved May 20th, 1888, bred by exhibitor ; sire, Lord Lansdowne, [933] ; dam, Rose, [953] by John A., [852], etc.

OTTAWA.

1st. W. J. Rudd, Eden Mills, "Frances," [962]. (See above, Toronto).
2nd. W. J. Rudd, Eden Mills, "Ethel," [961]. (See above, Toronto).
3rd. W. J. Rudd, Eden Mills, "Effie [963]. (See above, Toronto).

Heifer 1 year old.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Fanny," [985] ; calved May 20th, 1889, bred by exhibitors : sire, Lord Lansdowne, [933] ; dam, Rose, [953], by Sir John A., [852], etc.
2nd. Samuel Harper, Cobourg, "Lily, [989] ; calved April 1st, 1889, bred by exhibitor ; sire, Luther, [931]; dam, Sally, [923], by Jack's Alive, [749], etc.
3rd. W. J. Rudd, Eden Mills, "Gem," [986]; calved Jan. 15th, 1889, bred by exhibitor ; sire, Lord Lansdowne, [933]; dam, Charlotte, [954], by Curly Tom, [886], etc.

OTTAWA.

1st. W. J. Rudd, Eden Mills, "Gem, [986]. (See above, Toronto).
2nd. W. J. Rudd, Eden Mills, "Fanny," [985]. (See above, Toronto).

Heifer Calf, under 1 year.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Roda ;" sire, Duke, [947] ; dam, Rose, [953], by John A., [852], etc.
2nd. W. J. Rudd, Eden Mills, "Twilight ;" sire, Duke, 947 ; dam, Charlotte, [954], by Curly Tom, [886], etc.
3rd. Samuel Harper, Cobourg, "Dame Trot ;" sire, Buffalo Jack. [ ], dam, Lizzie.

OTTAWA.

1st. W. J. Rudd, Eden Mills, "Roda." (See above, Toronto).
2nd. W. J. Rudd, Eden Mills, "Twilight." (See above, Toronto).

Herd, consisting of 1 bull and 4 females, over 1 year old, owned by the exhibitor.

TORONTO.

1st. W. J. Rudd, Eden Mills.
2nd. Samuel Harper, Cobourg.

OTTAWA.

1st. W. J. Rudd, Eden Mills.
2nd. W. J. Rudd, Eden Mills.

Female, any age.

TORONTO.

1st. W. J. Rudd, Eden Mills, "Rene," [952].

AYRSHIRES.

Bull, 3 years old and upwards.

TORONTO.

1st. Jas Drummond, Petite Cote, Montreal, Que , "Rob Roy of Park Hill," —876—; dark red with large white spots, calved Jan. 4th, 1886, bred by exhibitor : sire, Promotion, (imp.) —81—; dam, Viola III., (imp), —1612—.
2nd. W. M. & J. C. Smith, Fairfield Plains, "Rob Roy of Oxford," —300— ; brown and white, calved March, 1881. bred by Thos. Nichol, Plattsville ; sire, Arthur Mars, —109— ; dam, Fancy, —523— by Canada, —153—, etc.
3rd. Jas. McCormick, Rockton, "Campbell O.E.F.," —357—; red and white, calved June 5th, 1885, bred the Ontario Agricultural College, Guelph ; sire, Campbell of Drumlanrig, (imp.) —39— ; dam, Stately III. of Drumlanrig, (imp.), —74—.

LONDON.

1st. M. Ballantyne, St. Mary's, "Lorne of the Lee, —579— ; dark red and white, calved Oct. 31st, 1886, bred by A. P. Ball, Stanstead, Que.; sire, Sandy Lee, —578— ; dam, Mary True. —1179— by Dunmore —577— etc.

Bull, 2 years old and upwards.

Ottawa.

1st. Jas. Drummond, Petite Cote, Montreal, Que., "Rob Roy of Parkhill," —876—. (See above, Toronto).
2nd. R. Robertson, Howick, Que., "Golden Guinea," 4454; red and white, calved May 14th, 1886, bred by Jas. Stephen, Trout River, Huntingdon, Que.; sire, Duke of Argyle, 2921; dam, Daisy II. 2915, bv Lord Dufferin, 1170, etc.
3rd. W. C. Edwards & Co., Rockland, "Duke of Ayr."

Bull, 2 years old.

Toronto.

1st. T. Guy, Oshawa, "Butterflv Duke," —501—: red and white, calved April 2nd, 1888, bred by exhibitor; sire, Butterfly of Oshawa, —352—; dam, Perfection, —181—, by Eclipse, —105—, etc.
2nd. Thos. Brown, Petite Cote, Montreal, Que.
3rd. Jno. Cunningham, Norval, "Tam O'Shanter," —469—; red and white, calved March 27th, 1888, bred by Jas. Clark, Brampton; sire, Campbell O.E.F., —357—; dam, Maud Mars, —634—, by Sir Colin, —138—, etc.

London.

1st. Thos. Guy, Oshawa, "Butterfly Duke," —501—. (See above, Toronto).
2nd. Nichol Bros., Plattsville, "Oxford King," —A55—; red and white, calved Oct. 13th, 1887, bred by Thos. Nichol, Plattsville; sire, Ramsay Lad, —A42—; dam, Flora of Oxford, —525—, by Rob Roy of Oxford, —300—, etc.

Bull, 1 year old.

Toronto.

1st. Thos. Guy, Oshawa, "Gen. Gordon."
2nd. W. M. & J. C. Smith, Fairfield Plains, Ont., "Burford" —585—, red and white; bred by exhibitors; sire, Rob Roy of Oxford —300—, dam, Gurta IX. —840—, by Stonecalsey III. —431—, etc.
3rd. Jas. McCormick, Rockton, "Eclipse" —777—, dark red and white, calved Sept. 3rd, 1888; bred by exhibitor; sire, Hero of Rockton —220—, dam, Rosebud —198—, by Indian Chief —129—, etc.

London.

1st. Kains Bros., Byron, "Prince of Byron" —583—, red and white, calved Sept. 20th, 1888; bred bv Kains Bros., Byron; sire, Stonecalsay (imp.), —34—, dam, Victoria of Byron —484—, by Lord Primrose —269—, etc.
2nd. Thos. Guy, Oshawa, "Baron of Park Hill' —978—, dark red and white, calved Aug. 16th, 1889; bred by Jas. Drummond, Petite Cote, Montreal, Que.; sire, Rob Roy —876—, dam, Lillie of Hardiston (imp.), —1642—.

Ottawa.

1st. Jas. Drummond, Petite Cote, Montreal, "Victor of Park Hill," 5721.
2nd. F. W. Kennedy, Billings Bridge, "Duncan' —603—, red and white, calved Aug. 27th, 1889; bred by exhibitor; sire, Frank Ramsay —449—, dam, Silva —904—, by Cherry Prince, jr. —445—, etc.
3rd. W. C. Edwards & Co., Rockland, "Donovan," 5319.

Bull calf, under 1 year.

Toronto.

1st. Jas. Drummond, Petite Cote, Montreal. Que., "Morgan of Park Hill," 5128.
2nd. Wm. Stewart, jr., Menie, "Lorne of the Lee" —888—, red and white, calved Dec. 22nd, 1889; bred by exhibitor; sire, Gen. Middleton —443—, dam, Annie Laurie —1096—, by Wellington *alias* Gladstone —330—, etc.
3rd. Thos. Brown, Petite Cote, Montreal, "Cock a Bendie," 5365.

LONDON.

1st. Thos. Guy, Oshawa, "White Prince," sire, Butterfly Duke —501—, dam, Model —403—, by Bismarck —119—, etc.

2nd. Geo. Hill, Delaware, "Robbie Burns" —A207—, red and white, calved March 4th, 1890; bred by exhibitor; sire, Malcolm —594—, dam, Louisa II —A87—, by Charlie Ross —A45—, etc.

OTTAWA.

1st. Jos. Yuill, Carleton Place, "Jock Meadowside" —713—, red and white, calved Feb. 18th, 1890; bred by exhibitor; sire, Jock —344—, dam, Bonny Lass —670—, by Carrick Lad —176—, etc.

2nd. Thos. Brown, Petite Cote, Montreal, Que.

3rd. Jas. Drummond, Petite Cote, Montreal, Que., "Morgan of Parkhill, 5128. (See above, Toronto.)

Bull, any age.

TORONTO.

1st. Jas. Drummond, Petite Cote, Montreal, "Rob Roy," 3971.

LONDON.

1st. Thos. Guy, Oshawa, "Butterfly Duke" —501—.

OTTAWA.

1st. Jas. Drummond, Petite Cote, Montreal, "Rob Roy," 3971.

Cow, 4 years old and upwards.

TORONTO.

1st. Jas. Drummond, Petite Cote, Montreal, "Viola III." —1612—, red and white, calved in 1882; bred by Chas. Kay, Mill Farm, Gargnnock, Scotland; sire, Gallant Graham, dam, Viola II., by Ethelbert, etc.

2nd. Jas. McCormick, Rockton, "Primrose IV." —302—, red and little white, calved Sept. 20th, 1878; bred by Thos. Guy, Oshawa; sire, Indian Chief —129—, dam. Primrose III. —196—, by Eclipse —105—, etc.

3rd. Thos. Brown, Petite Cote, Montreal.

LONDON.

1st. Kains Bros., Byron, "Jennie of Auchenfrain" (imp.) —129—, red and white, calved April, 1882; imported in 1884, bred by Robt. Wallace, Auchenfrain, Scotland; sire, Duke III. (647), dam, Paisley, by Wallace of Drumlanrig (61), etc.

2nd. Thos. Guy, Oshawa, "Ida" —845—, white and red, calved March 10th, 1884; bred by John Lawrie, Malvern; sire, Lord Lorne —307—, dam, Mary —836—, by Carluke —428—, etc.

Cow, 3 years old and upwards.

OTTAWA.

1st. Jas. Drummond, Petite Cote, Montreal, Que., "Viola III." —1612—. (See above, Toronto.)

2nd. Thos. Brown, Petite Cote, Montreal, Que.

3rd. Jas. Drummond, Petite Cote, Montreal, Que., "Lillie of Hardiston" (imp.) —1642—, red with small white spots, calved April 29th, 1883; bred by Duncan Keir, Hardiston, Bucklyvil, Scotland; sire, Young Baron, dam, The Twin, both in Scotland.

Cow, 3 years old.

TORONTO.

1st. Jas. Drummond, Petite Cote, Montreal, "Viola V.," 4540, white with small red spots, calved Aug. 23rd, 1887; bred by exhibitor; sire, Promotion (imp.), —81—, dam, Viola III. (imp.), —1612—, by Gallant Graham, etc.

2nd. T. Guy, Oshawa, Ont., "Lady Wallace II." —909—, red and white, calved Dec. 20th, 1887; bred by exhibitor; sire, Butterfly of Oshawa —454—, dam, Lady Wallace —913—, by William Wallace —130—, etc.

3rd. W. Stewart, jr., Menie, "Jessie Stewart" —538—, red and white; bred by exhibitor, sire, Success —305—, dam, Princess of Menie —537—, by Duke of Belleville —302—, etc.

LONDON.

1st. Kains Bros., Byron, "Flossy" —1193—, red and white, calved Aug. 21st, 1887 ; bred by A. Kains & Sons, Byron ; sire, Stonecalsay (imp.) —34—, dam, Dolly of Byron —1086—, by Watty Mars —268—, etc.
2nd. Thos. Guy, Oshawa, "Roseate II." —A360—, red and white, calved April 10th, 1880 ; bred by exhibitors ; sire Indian Chief —129—, dam, Roseate —A212—, by Bismarck —119—, etc.

Heifer, 2 years old.

TORONTO.

1st. Thos. Guy, Oshawa, "Lady Wallace III." —1741—, red and white, calved Dec. 20th, 1887 ; bred by exhibitor ; sire, Butterfly of Oshawa —454—, dam, Lady Wallace (913), by Wm. Wallace —130—, etc.
2nd. Wm. Stewart, jr., Menie, "Lady McDonald" —899—, red and white, calved May 14th, 1888 ; bred by exhibitor ; sire, General Middleton —443—, dam, Princess of Menie —537—, by Duke of Belleville —302—, etc.
3rd. Jas. Drummond, Petite Cote, Montreal, "Bird" P. H., 5120.

LONDON.

1st. Geo. Hill, Deleware, "Eve."
2nd. Thos. Guy, Oshawa, "Lady Wallace III.," —1741—. (See above, Toronto.)

OTTAWA.

1st. W. C. Edwards & Co., Rockland, "Lindsay 5th of Barcheskie."
2nd. W. C. Edwards & Co., Rockland, "Countess of Barcheskie."
3rd. Thos. Brown, Petite Cote, Montreal, Que.

Heifer, 1 year old.

TORONTO.

1st. T. Guy, Oshawa, Ont., "Model 5th" —1200—, red and white, calved Oct. 1st, 1888 ; bred by exhibitor, sire, Butterfly of Oshawa, —454—, Model, —403—, by Bismarck, —119—, etc.
2nd. Jas. McCormick, Rockton, "Primrose VI." sire, Hero of Rockton IV.
3rd. Jas. Drummond, Petite Cote, Montreal, Que., "Beatrice of Park Hill, 5001.

LONDON.

1st. Thos. Guy, Oshawa, "Violet 3rd —1251—, red and white, calved Sept. 5th, 1888 ; bred by exhibitor, sire, Butterfly Duke —454—, dam, Violet —763—, by Wm. Wallace —130—, etc.
2nd. Thos. Guy, Oshawa, "Model V. —1200—. (See above, Toronto).

OTTAWA.

1st. Jas. Drummond, Petite Cote, Montreal, Que., "Beatrice of Park Hill" 5001. (See above, Toronto.
2nd. J. G. Clarke, Ottawa.
3rd. W. C. Edwards & Co., Rockland, "Rosa Bella" —1322—, red and white, calved April 8th, 1889 ; bred by exhibitor, sire, Promotion (imp) —81—, dam, Elsie II. —1299—, by Sir Roger III. —609—, etc.

Heifer calf under 1 year.

TORONTO.

1st. Thos. Brown, Petite Cote, Montreal, Que.
2nd. Jas. Drummond, Petite Cote, Montreal, Que., "Nell of Park Hill," 5127.
3rd. Jas. McCormick, Rockton, "Flora Campbell."

LONDON.

1st. Thomas Guy, Oshawa, "Ida III.," sire Butterfly of Oshawa —454—, dam, Ida [1837].
2nd. Kains Bros., Byron, "Vida D."

OTTAWA.

1st. Thos. Brown, Petite Cote, Montreal, Que.
2nd. Jas. Drummond, Petite Cote, Montreal "Nell of Park Hill" 5127.
3rd. Jos. Yuill, Carleton Place, "May Meadowside"—750— red and white, calved Jan. 21st, 1890 ; bred by exhibitor, sire, Jock, —344—, dam, Beauty Bride, —690—, by Rob Roy of Oxford, —300—, etc.

Herd consisting of 1 Bull and 4 females over 1 year old, owned by exhibitors.

TORONTO.

1st. Jas. Drummond, Petite Cote, Montreal, Que.
2nd. Jas. McCormick, Rockton.
3rd. Thos. Guy, Oshawa.

LONDON.

1st. Kains Bros., Byron.

OTTAWA

1st. Jas. Drummond, Petite Cote, Montreal.
2nd. Thos. Brown, Petite Cote, Montreal, Que.
3rd. W. C. Edwards & Co., Rockland.

Female any age.

TORONTO.

1st. Jas. Drummond, Petite Cote, Montreal Que., "Viola III." (imp.) —1612—.

JERSEYS.

Bull 3 years old and upwards.

TORONTO.

1st. Geo. Smith & Son, Grimsby.
2nd. Wm. Rolph, Markham, "Canada's John Bull V." 20092, sire, Canada's John Bull, dam Marion Poges.
3rd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Orloff's Stoke Poges" 11157. sire, Orloff, 3143, dam, Cheerful of St. L.

LONDON.

1st. Rock Bailey, Union, "Royal Mike of Oak Grove" 23021, sire, Marlett's Champion, 6676, dam, Lady Mickikee, 50094, etc.

Bull, 2 years old and upwards.

OTTAWA.

1st. W. A. Ruben, Ste. Anne de Bellevue, Que., "Orloff's Stoke Poges" 11157. (See above Toronto.)
2nd. E. B. Eddy, Hull, Que., "Rioter Lisgar Pogis" 15976, sire, Rioter Lisgar, 11520, dam, Millie McClellan, 25338, by Snedens, 4882.
3rd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Prince Hugo of Ste. Anne's, 23710.

Bull, 2 years old.

TORONTO.

1st. J. Clark, Brampton, "Mighty Dollar" 24051, sire, One Hundred Per Cent, dam, Dove of Copely Springs.
2nd. A. McLean Howard, Jr., Toronto, "Chief of Glen Duart" 24340, sire, Canada's John Morgan, 16853, dam, St. Helier Onona.
3rd. Oakdale Stock Farm, Pickering, "Bell Boy." sire, Ollie Boy, 16668, dam, Chisbie Pride, 24618.

LONDON.

1st. H. R. Moore, London.

Bull, 1 year old.

TORONTO.

1st. John Maughan, Toronto, "Fawn King" 22791, sire, Canada's John Morgan, 16853, dam, Violet of Glen Duart, 40710.
2nd. A. M. Dodge, Waubaushene, "Malcolm" 23718, sire, Albert's John Bull, 18320, dam, Fancy of Verna, 18589.
3rd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Victor Hugo of Ste. Annes" 25701, sire, Hebes Victor Hugo, dam, Queen of Ste. Annes.

London

1st. Jno. O'Brien, London West, "Hero of Spring Farm" 41.
2nd. Rock Bailey, Union, Oak Grove, "Stoke Poges," sire, Kitty's Stoke Poges, 19328, dam, Lillian Poges, 47974, etc.

Ottawa.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Victor Hugo of Ste. Annes," 25701. (See above, Toronto.)
2nd. T. B. Caldwell, Lanark, "Clyde Pogis," 22421.
3rd. W. A. Reburn, Ste. Anne de Bellevue, Que., "May's Pogis of St. Anne's," 25702.

Bull Calf, under 1 year.

Toronto.

1st. A. McLean Howard, Jr., Toronto, ; sire, Canada's Jno. Morgan, 16853; dam, Mary of Glen Duart, 40709, etc.
2nd. A. M. Dodge, Waubashene, ; sire, Albert's John Bull, 18320; dam, Eastern Star, 20145, etc.
3rd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Lisgar Pogis of Ste. Anne's," 257041; sire, ; dam, Snowdrop of Ste. Anne.

London.

1st. Jno. O'Brien, London West, "London Lad," 22.

Ottawa.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Lisgar Pogis of Ste. Anne's," 25704. (See above, Toronto).
2nd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Gipsy Boy of Ste. Anne's," 25705.

Bull, any age.

Toronto.

Geo. Smith & Son, Grimsby.

London.

Jno. O'Brien, London West, "Hero of Spring Farm," 22.

Ottawa.

W. A. Reburn, Ste. Anne de Bellevue, Que., "Orloff's Stoke Pogis," 11157.

Cow, 4 years old and upwards.

Toronto.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Jolie of St. Lambert IV.," 38666; sire Orloff's Stoke Pogis; dam, Pogis Jolie of Lambert, etc.
2nd. A. M. Dodge, Waubushene, "Fancy of Verna," 18589; sire, Engineer, 606; dam, "Fairy of Verna 18589.
3rd. A. McLean, Howard Jr., Toronto, "Mary of Glen Duart," 40709; sire, Actor of Hillhurst 10404; dam, Rose of Hillhurst 22806, etc.

London.

1st. Jno. O'Brien, London West, "Eye of Hillhurst," 22808.
2nd. Rock Bailey, Union, "St. Lambert's Beauty," 41069; sire, Diana's Rioter, 10486; dam, Beauty of Lee Farm, 15694, etc.

3 years old and upwards.

Ottawa.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Jolie of St. Lambert IV." 38666. (See above, Toronto.)
2nd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Dora of St. Anne's," 41014.
3rd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Jolie of St. Lambert V.," 47354.

Cow, 3 years old.

TORONTO.

1st. A. McLean Howard, Jr., Toronto, "Cathula of Gen. Duart," 44220 ; sire, Actor of Hillhurst, 10404 ; dam, Rose of Hillhurst, 22806, etc.
2nd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Jolie of St. Lambert V.," 47354 ; sire, Hebes Victor Hugo ; dam, Jolie of St. Lambert, etc.
3rd. Oaklands Stock Farm, Pickering.

LONDON.

1st. Rock Bailey, Union, "Champion's Zippie," 50093 ; sire, Marlett's Champion, 6676 ; dam, Lion's Zippie 17325, etc.

Heifer, 2 years old.

TORONTO.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Lady Banff of Ste. Anne IV.," 59994 ; sire, Romeo of St. Lambert ; dam, Lady Banff of Ste. Anne, etc.
2nd. Wm. Rolph, Markham, "St. Lambert's Nancy," 56503 , sire, Canada's John Bull ; dam, Nancy of St. Lambert, etc.
3rd. G. Smith & Son, Grimsby.

LONDON.

1st. H. R. Moore, London.
2nd. H. R. Moore, London.

OTTAWA.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Lady Banff of Ste. Anne's " 4th, 59994.
2nd. Fowler & Storr, Ottawa.
3rd. Fowler & Storr, Ottawa.

Heifer, 1 year old.

TORONTO.

1st. W. A. Reburn, Ste. Anne de Bellevue, Que., "Lorna Doon of Ste. Anne II." 65969 : sire, Hebes Victor Hugo ; dam, Lorna Doon of Ste. Anne's, etc.
2nd. W. A. Reburn, Ste. Anne de Bellevue, Que., "Eva of Ste. Anne" 65011 ; sire, Lord Lisgar of Ste. Anne ; dam, Pearl of Ste. Anne, etc.
3rd. Wm. Rolph, Markham, "Brier of St. Lambert," 61750 ; sire, Canada's John Bull III. ; dam, Sweet Briar, etc.

LONDON.

1st. Rock Bailey, Union, "Rose of Oak Grove" 58352 ; sire, King Hugo of Ste. Anne's 16396 ; dam, Daisy of Maple Lane, 44546, etc.
2nd. Rock Bailey, Union, "Ethel of Oak Grove" 58351 ; sire, King Hugo of Ste. Anne's 16396 ; dam, Clover Smith, 29523, etc.

OTTAWA.

1st. W. A. Reburn, Ste Anne de Bellevue, Que., "Eva of Ste Anne's," 65011. (See above, Toronto).
2nd. W. A. Reburn, Ste Anne de Bellevue, Que., "Lorna Doon of Ste. Anne's 2nd," 65969. (See above, Toronto).
3rd. W. A. Reburn, Ste Anne de Bellevue, Que., "Briar of Ste Anne's," 65008.

Heifer Calf, under 1 year.

TORONTO.

1st. J. H. Smith, Highfield, "Phyllis ;" sire, Pr. Oak Lawn, 18851 ; dam, Mabel, 9513, etc.
2nd. W. A. Reburn, Ste Anne de Bellevue, Que., "Pet of Ste Anne 2nd, 65973 ; sire, Romeo of Ste Lambert ; dam, Pet of Ste Anne.
3rd. A. M. Dodge. Waubaushene,————————sire, Albert's John Bull 18320 ; dam, Eastern Star, 20145, etc.

LONDON.

1st. Rock Bailey, Union, "Mauline of Oak Grove,"————sire, King Hugo of Ste Anne's 16396 ; dam, St. Lamberts Beauty, 41069, etc.

OTTAWA.

1st. Fowler & Starr, Ottawa.
2nd. W. A. Reburn, Ste Anne de Bellevue, Que., "Jolic of St. Lambert 6th," 65972.
3rd. W A. Reburn, Ste Anne de Bellevue, Que., "Pet of Ste Anne's 2nd," 65973. (See above, Toronto).

Herd, consisting of 1 Bull and 4 Females, over 1 year old, owned by exhibitor.

TORONTO.

1st. W. A. Reburn, Ste Anne de Bellevue, Que.
2nd. G. Smith & Son, Grimsby.
3rd. A. McLean Howard, jr., Toronto.

LONDON.

1st. Rock Bailey, Union.

OTTAWA.

1st. W. A. Reburn, Ste Anne de Bellevue, Que.
2nd. do do do
3rd. do do do

GUERNSEYS.

Bull, 2 years old and upwards.

OTTAWA.

1st. Hon. J. J. Abbott, St. Anne's, Que., "Rosinas Presto," (1880).

Cow, three years old and upwards.

OTTAWA.

1st. Hon. J. J. C. Abbott, Ste Anne's, Que., "Rosina," (735).

Heifer, two years old.

OTTAWA.

1st. Hon. J. J. C. Abbott, Ste Anne's, Que., "Rosary," (3549).

Heifer, 1 year old.

OTTAWA.

1st. Hon. J. J. C. Abbott, Ste Anne's, Que., "Nipthelos," (4602).
2nd. Hon. J. J. C. Abbott, Ste Anne's, Que., "Rosina 3rd," (4606).

Heifer Calf, under 1 year.

OTTAWA.

1st. Hon. J. J. C, Abbott, Ste Anne's, Que., "Rosina V."
2nd. Hon. J. J. C. Abbott, Ste Anne's, Que., "Rosina 4th."

Herd, consisting of one Bull and four females, over 1 year.

OTTAWA.

1st. Hon. J. J. C. Abbott, Ste Anne's, Que.

HOLSTEINS.

Bull, 3 years old and upwards.

TORONTO.

1st. Alex. Kennedy, Ayr, "Woodbine Prince," 6712; sire, Tyrant, 4017; dam Flora Jane (imp.), 10447, etc.
2nd. Smith Bros., Churchville, "Minks Mercedes Baron," 5676; sire, Mercedes Prince, dam, Mink, etc.
3rd. A. C. Hallman & Co, New Dundee, "Prairie Aaggie Prince," 2; sire, Royal Aaggie; dam, Prairie Flower, etc.

LONDON.

1st. A. C. Hallman & Co, New Dundee, "Prairie Aaggie Prince, 2. (See above, Toronto).
2nd. Wyton Stock Breeders Ass'n, Wyton, "Konig Nicholaas," 531; sire, Nicholaas, 184; dam, Geerje, 906, etc.

Bull, 2 years old and upwards.

OTTAWA.

1st. Jas. Fletcher, Oxford Mills, "Burback," 15277.
2nd. F. H. McCrae, Brockville.
3rd. F. H. McCrae, Brockville.

Bull, 2 years old.

TORONTO.

1st. Maple Grove Stock Farm, Picton, "Earlescourt Chief," 10079; sire, Prince Rutherford; dam, Rosa B. Arminie, etc.

LONDON.

1st. John H. Silvester, Ratho, "Oxford Billy," 12422; sire, Prince Prestage, 2117; dam Michigan Maid, 211, etc.
2nd. Wyton Stock Breeders Ass'n, Wyton, "Baron Milburn," 8717; sire, Sir James of Aaggie, 1452; dam, Fadetta, 2718, etc.

Bull, 1 year old.

TORONTO.

1st. A. C. Hallman & Co., New Dundee, "Royal Canadian Netherland," 14804, sire, Netherland Prince; dam, Princess Margaret, etc.
2nd. Felin & Breckin, Oakville, "Island Maid's Dickson," 15413; sire, Sir Dickson; dam, Island Maid, etc.

LONDON.

1st. A. C. Hallman & Co., New Dundee, "Royal Canadian Netherland," 14804. (See above, Toronto.)

OTTAWA.

1st. Thos. Davidson, Spring Valley, "Lady Saltine 2nd's Prince," 14738.
2nd. Thos. Davidson, Spring Valley, "Grip 2nd," 14912.

Bull calf, under 1 year.

TORONTO.

1st. Smith Bros., Churchville, "Cornelia's Tensen's Mink's Mercedes," sire Mink's Mercedes Baron, dam, Cornelia Tensen, etc.
2nd. R. S. Stevenson, Ancaster, ——— sire, Netherland Romulus, dam, Cora Tensen.
3rd. Alex. Kennedy, Ayr, "Eligible," sire, Iras King, 12029, dam, Mavourney, 9200, etc.

LONDON.

1st. Wyton Stock Breeders' Association, Wyton, "Stamford," 15883, sire, Sir James of Aaggie, 1452, dam, Keturah, 1595, etc.
2nd. Wyton Stock Breeders' Association, Wyton, "Auctioneer Boy," 15882, sire, Baron Milburn, 8717, dam, Ernestine II., 475, etc.

OTTAWA.

1st. Jas. Fletcher, Oxford Mills.
2nd. Thos. Davidson, Spring Valley, "Captain Dan McGinty."
3rd. Jas. Fletcher, Oxford Mills.

Bull, any age.

TORONTO.

1st. Alex. Kennedy, Ayr, "Woodbine Prince," 6712.

LONDON.

1st. A. C. Hallman & Co., New Dundee, "Prairie Aaggie Prince," 2.

OTTAWA.

1st. Jas. Fletcher, Oxford Mills, "Burback," 15277.

Cow, 4 years old and upwards.

Toronto.

1st. Smith Bros., Churchville, "Marion," (imp.), 1812, sire, Nicholas II., dam, Yepypma, etc.

2nd. Alex. Kennedy, Ayr, "Mavourney" (imp.), 9200, sire, ——————— dam, Wilhelmina, 268, etc.

3rd. R. T. Stevenson, Ancaster, "Patsy" (imp.), 970, sire, District Bull, dam, Trigntje, etc.

London.

1st. Wyton Stock Breeders' Association, Wyton, "Sir Henry of Aaggie's Maid," 8195, sire, Sir Henry of Aaggie, 1450, dam, La Polka II., 2772, etc.

2nd. A. C. Hallman & Co., New Dundee, "Mina Rooker," 9893.

Cow, 3 years old and upwards.

Ottawa.

1st. F. H. McCrae, Brockville.

2nd. Jas. Fletcher, Oxford Mills, "Ottile II."

3rd. Jas. Fletcher, Oxford Mills, "Vronka."

Cow, 3 years old.

Toronto.

1st. Smith Bros., Churchville, "Siepkje IV.," 10349, sire, Rothmere, dam, Siepkje.

2nd. Jno. Woodhall, Brampton, "Edgely Beauty," 6548, Vol. H.F.H.B., sire D. of Edgely, dam, Brema.

3rd. A. C. Hallman & Co., New Dundee, "Phœbe Zeeman II.," 9169, sire, Prairie Aaggie Prince, dam, Phœbe Zeeman.

London.

1st. A. C. Hallman & Co., New Dundee, "Phœbe Zeeman II.," 9169. (See above, Toronto.)

Heifer, 2 years old.

Toronto.

1st. A, C. Hallman & Co., New Dundee, "Queen of Waterloo," 14666, sire, African Prince, dam, Mina Rooker, etc

2nd. Alex. Kennedy, Ayr, "Princess of Woodbine," 14293, sire, Tyrant, 4017, dam, Flora Jane II., 4061, etc.

3rd. Felan & Breckin, Oakville, "Anna Roberts II.," 16326, sire, McComb, dam, Anna Roberts, etc.

London.

1st. A. C. Hallman & Co, New Dundee, "Queen of Waterloo," 14666. (See above Toronto).

2nd. Wyton Stock Breeders Association, Wyton, "Gipsy Queen 3rd's Daughter," 11131 sire, Sir James of Aaggie, 1452, dam, Gipsy Queen III, 3491, etc.

Ottawa.

1st. Jas. Fletcher, Oxford Mills, "Hasketon Belle," 13939.

2nd. Jas. Fletcher, Oxford Mills, "Winston," 13940.

Heifer 1 year old.

Toronto.

1st. A. C. Hallman & Co., New Dundee, "Artis Kassie III," 20754, sire, Prairie Aaggie Prince, dam, Artis Kassie, etc.

2nd. Smith Bros Churchville, "Little Tensen" 17880, sire, Ykema V., dam, Cornelia Tensen, etc.

3rd. Smith Bros., Churchville, "Aaggie Idaline VI's. Princess" (imp.) 13030, sire, Prince of Artis, dam, Aaggie Idaline VI., etc.

London.

1st. A. C. Hallman & Co., New Dundee, "Artis Kassie III." 20754. (See above, Toronto).

2nd. Wyton Stock Breeders Association, Wyton, "Fadetta III." 15791, sire, Sir James of Aaggie 1452, dam, Fadetta 2718, etc.

OTTAWA.

1st. F. H. McCrae, Brockville.
2nd. F. H. McCrae, Brockville.
3rd. Jas. Fletcher, Oxford Mills, "Kitty Marlin 19652.

Heifer calf under 1 year.

TORONTO

1st. A. C. Hallman & Co., New Dundee, "Princess Medina," sire, Prairie Aaggie Prince, dam, Princess Margaret, etc.
2nd. A. C. Hallman & Co., New Dundee, "Princess Lena."
3rd. A. C. Hallman & Co , New Dundee, " Flora Ann's Gem," sire, Prairie Aaggie Prince, dam, Flora Ann, etc.

LONDON.

1st. A. C. Hallman & Co., New Dundee, "Flora Ann's Gem." (See above, Toronto).
2nd. Wyton Stock Breeder's Association, Wyton, "Ybeltje of Wyton 22067, sire, Mooie Hartog III. 408, dam, Ybeltje 5th, 1268 etc.

OTTAWA.

1st. Jas. Fletcher, Oxford Mills.
2nd. Jas. Fletcher, Oxford Mills.
3rd. F. H. McCrae, Brockville.

Herd consisting of 1 bull and 4 females over 1 year, owned by exhibitor.

TORONTO.

1st. Alex. Kennedy, Ayr.
2nd. Smith Bros., Churchville.
3rd. R. S. Stevenson, Ancaster.

LONDON.

1st. A. C. Hallman & Co., New Dundee.

OTTAWA.

1st. Jas. Fletcher, Oxford Mills.
2nd. F. H. McCrae, Brockville.

ONTARIO VETERINARY COLLEGE.

THE GRADUATING CLASS, 5TH APRIL, 1890.

Arrell, J. T.	Caledonia, Ont.
Ashton, Geo. E. W.	North Shefford, P. Q.
Armour, William J.	Milton, Ont.
Austin, W. G. E.	Ottawa, Ont.

Bailey, S. W.	Millbury, Ohio, U. S.
Bell, Samuel A.	Watertown, N. Y., U. S.
Bittles, Edmond E.	Waterford, Pa., U. S.
Benner, Willis Grant	Allentown, Pa.. U. S.
Boor, Orville L.	New Castle, Ind., U. S,
Brake, G. Bruce	St. Thomas, Pa., U. S.
Broad, S.	Little Britain, Ont.
Brodie, A. S.	Almira, Ont.
Bucke, William H.	West Manchester, Ohio, U. S.
Burwell, Edgar	South Easton, Pa., U. S.
Broaddus, Will. J.	Connersville, Ind., U. S.
Bales, Frank	Dana, Ind. U. S.

Carnes, H. G.	Greenwood, Ind, U. S.
Carr, Joseph	Elm Grove, Ont.
Carr, William R.	Westfield, Ont.
Clark, Charles H.	Grand Rapids, Mich., U. S.
Cook, Peter	Clinton, Ont.
Cook, Robert H.	Malton, Ont.
Cooper, Robert E.	Corvallis, Oregon, U. S.
Cowan, Walter D.	Galt, Ont.

Davitt, Michael Henry	Springfield, Mass., U. S.
Donoho. James	Ridgetown, Ont.
Dudgeon, William	Orangeville, Ont.
Darby, James W.	Dalesboro, Assa.

Elliott, William B.	Greenock, Ont.
Elliott, John W.	Aberdeen, S. Dak., U. S.
Elviage, James C.	Deleware, Ont.
Evans, Richard W.	Coldstream, Ont.

Fitch, Aubrey H.	Niagara Falls South, Ont.
Fleming, James	Detroit, Mich., U. S.
Fridirici, U. Grant	Tamaqua, Pa., U. S.
Finnigan, Philip Francis	Syracuse, N. Y., U. S.
Fyle, J. Johnson	Brantford, Ont.

Gerrow, W. J.	Omemee, Ont.
Giffen, John R.	Mayfield, Ont.
Gilpin, W. G.	Ottawa, Ont.
Golley, Joseph	Wingham, Ont.
Good. Lonzo B.	Columbus Grove, Ohio, U. S.

Hale, J. Ross	Upper Sandusky, Ohio, U. S.
Herold, Philipp	Fairberry, Neb, U. S.
Hart, Arthur C	Richfield, Ohio, U. S.
Heseltine, P.	Colborne, Ont.
Heslop, F. A	Appleby, Ont.
Hillegass, Jesse Z	Pennsburg, Pa., U. S.
Hooker, Charles C	Dana, Ind., U. S.
Horr, C. B	Greenwich, Ohio, U. S.
Hoisington, A. L	Canaan, Ohio, U. S.
Hatch, Charles E	Gainesville, N. Y., U. S.
Ireland, S. A	Laskay, Ont.
Irwin, Samuel	Orangeville, Ont.
Jobson, George	Franklin, Pa., U. S.
Johnston, Thomas	Bailieboro, Ont.
Jones, W. G	Strathroy, Ont.
Jones, Cornelius B	Chillicothe, Ohio, U. S.
Jose, Charles	Halloway, Ont.
Jupp, Spencer, jr	Petrolia, Ont.
Keene, Charles A	Providence, R. I., U. S.
Kennedy, William W	Woodstock, Ont.
Kerr, George	Mitchell, Ont.
King, Frank, jr	Uxbridge, Ont.
Lawson, William	Walkerton, Ont.
Lein, W. B	Elmira, Ont.
Linxwiler, John L	Hillsboro, Ill., U. S.
Little, William	Glenora, Man.
Lyons, W. S	Markdale, Ont.
McPherson, J. Gordon	Picton, Ont.
McCallister, Dennis	Kendall, Ont.
McCully, Robert W	St. Thomas, Ont.
McDonald, James	Summerside, P. E. I.
McEvers, William H	Chicago. Ill., U. S.
McRae, Christopher	Alexandria, Ont.
McKay, J. M	Malton, Ont.
McLean, J. N	Alliston, Ont.
Mohney, Otis H	Vicksburg, Mich, U. S.
Malcolm, Peter	St. Marys, Ont.
Martin, Wallace E	Toronto, Ont.
Mann, Wesley A	Strathroy, Ont.
Merchant, Banjamin H	Arcadia, Wis., U. S.
Mitchell, Charles Rodger	Shirgley, Ont.
Moore, Chas. S	Wellsville, N. Y., U. S.
Morrow, Frank	Strathroy, Ont.
Mowbray, John Alfred	Whitby, Ont.
Milroy, Andrew L	Covington Centre, N. Y., U. S.
Menhennitt, F. W	Champion, Mich., U. S.

Nagle, J. W	Salford, Ont.
Noble, E. S	Blair, Neb., U. S.
Oille, J. L	St. Thomas, Ont.
Oliver, Malcolm	Stayner, Ont.
Osler, H. N	Lincoln Falls, Pa., U. S.
O'Connor, J	Freelton, Ont.
Orr, Hugh S	Canaan, Ohio, U. S.
Parker, D. F	London, Ont.
Pardue, R. M	Sacramento, Cal., U. S.
Philip, Fred. W	Sparta, Ont.
Pilkey, B. C	Lindsay, Ont.
Pink, John James	Hull, P. Q.
Routledge, William	London, Ont.
Radley, Edwin C	Chatham, Ont.
Raban, R. M	Bristol, England.
Ramsay, Albert E	Eden Mills, Ont.
Regan, William J	Orillia, Ont.
Rettich, Edward	Germantown, Ohio, U. S.
Ritchie, James	Brechin, Ont.
Robertson, A	Elliott, Ont.
Rowe, Daniel H	Consecon, Ont.
Ryder, Daniel	Chambersburg, Pa., U. S.
Routhier, John A	Ottawa, Ont.
Rowell, Clifford B	Fairport, N. Y., U. S.
Scott, Warner B	Paddy's Run, Ohio, U. S.
Sharp, William V	Brookton, N. Y., U. S.
Sidebottom, Philip K	Manchester, England.
Skerritt, H. W	Deansville, N. Y., U. S.
Swedberg, Alf. W	Sterling, Va., U. S.
Smith, Erland D. F	West Richfield, Ohio, U. S.
Smith, James M	Cherokee, Iowa, U. S.
Spence, James H	St. Marys, Ont.
Stover, Mahlon G	Coopersburg, Pa., U S.
Strickler, Charles M	Greencastle, Pa., U. S.
Switzer, George R	Woodham, Ont.
Stewart, John C	Danville, Ill., U. S.
Todd, John H. C	Goodwood, Ont.
Teeple, George Robert	Napoleon, Ohio, U. S.
Terry, Addison J	Terrytown, Pa., U. S.
Thorne, James R	Simcoe, Ont.
Turner, William H	Lodie, Ohio, U. S.
Telfer, Thomas	Lowville, Ont.
Ullrich, John H	Decatur, Ill., U. S.
Waldron, Thomas M	Greensburg, Pa., U. S.
Walton, J. N	Woodstock, Ont.

Whitestine, O. G	Huntington, Ind., U. S.
Wilson, John H	London, Ont.
Wilson, Egerton T	Shetland, Ont.
Wootton, William C	Wellman's Corners, Ont.
Wright, Leslie A	Winfred, S. Dak., U. S.
Wannaw, Alexander	Kendal, Ont.
York, E. T. Lawley	Buffalo, N. Y., U. S.

THE GRADUATING CLASS, 19TH DEC. 1890.

Arnold, T. F	Lewiston, Mo., U. S.
Baldock, L. F	Mount Charles, Ont.
Cornell, J. H	Lambeth, Ont.
Cossitt, Newton	Brockville, Ont.
Culham, D	Sheffield, Ont.
Currie, John M	Mitchell, Ont.
Faughnam, J. C	Bodines, Pa., U. S.
Fleming, W. J	Millhaven, Ont.
Frank, James R	Strathroy, Ont.
Gilmour, R. G	Almonte, Ont.
Harrison, James	Fergus, Ont.
Hodgins, George M	Lucan, Ont.
Holder, S. T	Bloomington, Ont.
Kelley, James A	Orono, Ont.
Kennedy, Samuel	Rupert, Que.
Leslie, William	Northport, Ont.
Lockwood, Lyman D	Penn Yan, N. Y., U. S.
McMillan, Adam	Carberry, Man.
Mathers, Seth	Markdale, Ont
Miller, W. D	Findlay, Ohio, U. S.
Milne, John F	Clinton, Ont.
Morrow, A	Minesing, Ont.
Nelson, R. J	Paisley, Ont.
Patterson, L. N	Oakville, Ont.
Peck, C. L	Beamsville, Ont.
Pink, Charles	Ottawa, Ont.
Simon, W. H	St. John, New Brunswick.
Steiner, John	Bergen, N. Y., U. S.
Taylor, A. E	Brampton, Ont.
Teller, John H	Simcoe, Ont.
Thomson, N	Toronto, Ont.
Wilkins, George N. N	Baysville, Muskoka, Ont.

TREASURER'S REPORT FOR 1890.

Geo. Graham, Treasurer, in account with the Agriculture and Arts Association, for the year ending 31st December, 1890.

1890.	RECEIPTS.	No.	$ c.	$ c.
	DR.			
	To Balance from 1889	393		128 64
	RENTS.			
Feb. 5	P. Jamieson rent to first of February	393	500 00	
May 16	“ “ May	401	500 00	
Sept. 16	“ “ August	403	500 00	
Dec. “	“ “ November		500 00	
				2000 00
	REGISTRATION FEES.			
Jan. 31	H. Wade, Registration fees for January	393	233 00	
Mar. 1	“ “ “ February	395	298 00	
Apr. 1	“ “ “ March	“	286 75	
May 2	“ “ “ April	401	240 40	
Aug. 19	“ “ “ May	“	137 55	
	“ “ “ June	“	118 25	
	“ “ “ July	“	67 50	
Sep. 2	“ “ “ August	“	171 75	
Oct. 18	“ “ “ September	403	294 50	
Nov. 25	“ “ “ October	405	97 25	
Decr. 15	“ “ “ November	“	168 50	
“ 31	“ “ “ December	“	243 50	
				2356 95
	HERD BOOK.			
Jan. 31	H. Wade, Clydesdale Herd Book sold	393	39 25	
“ 31	Heavy Draught	“	1 50	
Mar. 1	H. Wade, Herd Book sold	395	46 30	
Apr. 1	“ “ “	“	55 90	
May 2	“ “ “	401	147 45	
Aug. 19	“ “ “ May	“	31 60	
	“ “ “ June	“	6 70	
	“ “ “ July	“	14 65	
	“ “ “ August	“	19 30	
	“ “ “ September	403	20 00	
	“ “ “ October	405	12 45	
Dec. 15	“ “ “ November	“	31 10	
“ “	“ “ “ December	“	6 70	
				4918 49
	LOAN ACCOUNT.			
Mar. 26	Proceeds of note discounted	395	1000 00	
				1000 00
	GOVERNMENT GRANT.			
Apr. 21	Provincial Treasurer on account	399	3500 00	
Oct. 9	“ balance of Grant	403	2500 00	
				6000 00
	INTEREST ACCOUNT.			11918 49
Dec. 19	Interest of Prince of Wales loan			56 00
				11974 49

TREASURER'S REPORT FOR 1890.—*Continued.*

1890.	—	PAYMENTS.	No.	$ c.	$ c.
		MISCELLANEOUS.			
Jan. 6....	6½	Paid Treasurer as per Auditor's report	394	5 00	
“ 6....	4	P. M. Springer, Am. Berkshire Association..........	“	14 00	
“ 6....	3	Wm. Hickson, rider at London........................	“	5 00	
Feb. 14....	17	D. S. Ritchie, bill posting	396	1 75	
Sept. 2....	78	G. Graham, for attg, audit Reg. Fees................	404	25 00	
Nov. 22....	92	H. Wade, expenses and disbursements	406	53 70	
Dec. 15....	100	Provincial Treasurer—heating offices	......	200 00	
“ 15 ...	101	Postage etc.	......	16 50	
“ 15....	102	J. T. Peterkin—sundries..................................	......	2 30	
					323 25
		Salaries.			
Jan. 6....	2	J. I. Hobson, Auditor....................................	394	30 00	
“ 6....	2½	J. Martin, “	“	15 00	
Jan. 29....	6	H. Wade, salary for January........................	“	190 00	
Feb. 16....	11	G. Graham “ “ “	“	33 00	
“ 27 .	19	H. Wade, salary for February	396	190 00	
“ 27	20	G. Graham, “ “ “	“	33 00	
Mar. 28....	26	H. Wade “ “ March	“	180 00	
“ 28....	27	G. Graham “ “ “	“	33 00	
Apr. 28....	35	H. Wade “ “ April	398	180 00	
May 2 ...	51	“ special salary	400	200 00	
“ 2....	52	“ salary for May	“	180 00	
July 1....	60	Geo. Graham, salary ending first July	402	25 00	
“ 1....	61	Henry Wade “ “ June................	“	180 00	
Aug. 14....	63	“ “ “ “ July	“	180 00	
“ 30....	68	“ “ “ “ August	“	180 00	
Sept. 29....	80	“ “ “ “ September	404	180 00	
“ 29....	81	Geo. Graham, salary....................................	“	25 00	
Oct. 21....	89	Henry Wade, salary for October	406	180 00	
Nov. 22....	91	“ “ “ November	“	180 00	
Dec. 15....	15	“ “ “ December	“	180 00	
“ 15....	15	George Graham, ‘ “	......	25 00	
					2599 00
		ADVERTISING.			
Feb. 3....	8	R. L. Polk & Co., advertising	394	6 50	
“ 16....	9	Hamilton *Spectator*..................	“	4 80	
					11 30
		POSTAGE.			
Jan. 29....	6½	Postage stamps as Reg. fees for January	394	8 00	
Mar. 1....	21	Henry Wade “ “ February............	396	8 00	
“ 14....	22	“ check for stamps	“	26 62	
Apr. 1....	22	“ postage stamps as Reg. Fees	“	12 00	
Apr. 9 ...	28	“ postage	398	9 00	
May 2....	48	“ “	400	5 00	
“ 2 ...	55	Treasurer's office, stamps............	“	2 00	
“ 2....	56	Postage stamps as Reg. Fees	402	13 40	
“ 9....	65	H. Wade “ “	“	6 00	
Aug. 19....	65	“ “ “ May	“	8 50	
“ 19 ...	66	“ “ “ June	“	9 50	
“ 19....	67	“ “ “ July	“	5 75	
Sept. 2....	77	“ “ “ August	404	17 75	
Oct. 18....	85	“ “ “	“	27 75	
Nov. 25....	93	“ “ “	406	12 25	
Feb. 16 ...	12	“ “ “	394	25 00	
Dec. 15 ...	105	H. Wade, postage stamps and registration	12	12 25	
“ 15 ..	108	G. Graham, charge for postage stamps	... ..	3 00	
“ 15 ...	109	H. Wade, postage stamps, fees for Reg. fees..........	......	21 50	
					233 77
		Carried forward..........................	......	....	....

TREASURER'S REPORT FOR 1890—*Continued.*

1890.		PAYMENTS.	No.	$ c.	$ c.
		Brought forward			167 32
		INTEREST ACCOUNT.			
Feb. 3....	7	J. I. Hobson, for Miss Loghrin, interest on mortgage	394	300 00	
Mar. 28....	25	H. Wade, interest on remainder of note...	396	6 52	
Apr. 1....	25	Discount on note	"	6 52	
Aug. 1....	62	John I. Hobson for Miss Loghrin	402	300 00	
					613 04
		HERD BOOK.			
Feb. 16....	14	H. Wade, Herd Book expenses	394	3 50	
" 16....	15	Mail Job Department	"	31 50	
Apr. 22....	34	Hunter, Rose & Co., printing	395	500 00	
" 28....	38	London Printing and Lithographing Co	"	5 00	
" 28....	40	Brown Bros	"	13 00	
May 28....	45	John Wanless, medals	400	40 00	
" 28....	49	H. Wade	"	7 70	
" 28....	52	Hunter, Rose & Co	"	315 30	
Dec. 15....	103	H. S. Hill, advertising etc	"	10 00	
					926 00
		EDUCATIONAL SCHEME.			
Feb. 16....	10	W. H. Hanover, prize for 1889	394	20 00	
					20 00
		OFFICE EXPENSES.			
Feb. 16....	13	Henry Wade, for office	394	12 57	
Apr. 9...	30	" "	398	7 62	
" 28....	36	A. J. Henderson	"	3 00	
" 28....	39	Chas. H. Edwards & Co	"	2 00	
May 2 ...	50	Office Expenses	400	4 89	
Aug. 22....	76	Edwards, Catchpole & Co., 3 qts. musilage	404	1 50	
Oct. 15....	82	Herd Book	"	33 00	
					64 58
		PRINTING.			
Feb. 14....	16	*Mail* Job Department, office printing	396	36 00	
" 14....	18	H. Wade, for Treasurers office, London	"	27 00	
Apr. 28....	37	*Mail* Job Department	298	7 75	
May 14....	59	*Mail* Job Department	402	18 35	
Aug. 22....	69	*Farm & Stock-Breeder's* paper	"	2 35	
" 22....	70	Hunter, Rose & Co	"	2 00	
" 22....	71	*Mail* Job Printing Co	"	16 25	
Dec. 15....	96	" "	"	37 50	
					147 00
		INSURANCE.			
Mar. 1...	23	H. Wade for Insurance	396	18 75	
Aug. 14....		" " on building	402	65 00	
					83 75
		BOARD EXPENSES.			
Mar. 14....	24	Member attending meeting of council	396	202 72	
Sept. 16....	79	" " "	401	190 24	
Dec. 11....	95	" " "	406	254 24	
Apr. 3....	31	H. Wade, for S. Dickie	398	7 00	
" 3....	32	Albin Rawlings, meeting at Toronto	"	16 00	
" 11....	33	James Rowand " "	"	15 20	
					685 40
		Carried forward			

TREASURER'S REPORT FOR 1890.—*Continued.*

1890.	—	PAYMENTS.	No.	$ c.	$ c.
		Brought forward	......	....	5707 49
		LOAN ACCOUNT.			
Mar. 28....	25½	Paid note dis. Dec, 19, 1889.........................	396	1000 00	
Apr. 24....	34½	" " Mar. 12, 1890..............	398	1000 00	
					2000 00
		EXHIBITION EXPENSES.			
Apr. 9....	29	H. Wade, Exhibition fees, Exhibition expenses......	398	14 00	
May. 2....	24	John Wanless, medals, ...$83	400	95 00	
" 2....	47	" veterinary prizes 12			
" 2....	74	*Empire* Printing & Publishing Co., Ex. expenses 1889	404	31 80	
" 2. ..	84	International membership fee........................	......	10 00	
					150 80
		GRANTS.			
Apr. 28....	41	Short Horn Breeders' Association as per resolution in December	398	1000 00	
					1000 00
		VETERINARY COLLEGE.			
Apr. 28....	42	Alexander & Cable Lith. Diplomas..................	400	71 43	
Dec. 24....	107	A. Rawlings, Vet. College, Exm. for Department....	... ..	16 00	
					87 43
		VETERINARY MUSEUM.			
Apr. 28....	43	Alexander & Cable........	400	48 57	48 57
		STATIONERY.			
Apr. 28....	44	Brown Bros............................	400	7 60	
May 2....	53	Rolph, Smith & Co	"	6 00	
Aug. 22....	72	Brown Bros	404	19 55	
May 9....	58	" "	402	12 00	
Aug. 22....	73	James Bain & Son..................................	404	9 90	
					55 05
		PETTY CASH.			
Aug. 22....	75	Henry Wade	404	14 83	
					14 03
		PRIZE FARMS.			
Oct. 9....	83	Wm. Donaldson	404	84 00	
Nov. 22....	90	J. I. Hobson, Judging Prize Farms..................	406	68 20	
Dec. 15....	99	J. Wanless, medals	......	63 00	
					215 20
		FAT STOCK SHOW.			
Oct. 9....	84	J. C. Snell, Committee......................	404	6 56	
Dec. 5....	94	H. Wade	406	300 00	
" 17....	106	H. Wade, for Fat Stock Show	.....	37 50	
					344 06
		PLOUGHING MATCH.			
Oct. 21....	86	Robt. Vance, Prov. Ploughing Match...............	406	150 00	
" 21....	87	Nicholas Awrey, M.P.P............................	"	150 00	
" 21....	88	Jonathan Sissons	"	150 00	
					450 00
					10,072 43
		Balance			1,902 06
		INTEREST ACCOUNT			11,974 49
		Balance cash brought down			1,902 06
		Add $6.52 charged twice, interest on note of $1,000..			6 52
					$1,908 58

ASSETS AND LIABILITIES of the Agriculture and Arts Association, December 31st, 1890.

RECEIPTS.	$ c.	DISBURSEMENTS.	$ c.
To cash balance from 1889	128 64	By Miscellaneous	323 25
" Registration fees	2,356 95	" Salaries	2,599 00
" Herd Book sales	432 90	" Advertising	11 30
" Rent of Building	2,000 00	" Postage	233 77
" Legislative Grant	6,000 00	" Interest Account	606 52
" Interest on Prince of Wales mortgage	56 00	" Herd Book	926 00
" Loan account, note discount	1,000 00	" Educational Scheme	20 00
	11,974 49	" Office Expenses	64 58
		" Printing	147 20
		" Insurance	83 75
		" Board Expenses	685 40
		" Loan Account	2,000 00
		" Exhibition Expenses	150 80
		" Grant Short Horn Breeder's Association	1,000 00
		" Veterinary College	87 43
		" " Museum	48 57
		" Stationery	55 05
		" Petty Cash payments	14 03
		" Prize Farms	215 20
		" Fat Stock Show	344 06
		" Ploughing Match	450 00
		" Cash on hand	1,908 58
			$11,974 49

Agricultural and Arts Association, December 31st, 1890.

ASSETS.	—	LIABILITIES.	—
	$ c.		$ c.
To Cash in Bank	1,931 77	By Mortgage on Real Estate	10,000 00
" " on hand	56 00	" Balance of Assets and Liabilities	56,687 77
" Real Estate, Agricultural Hall	60,000 00		
" Library	1,500 00		
" Prince of Wales fund	800 00		
" Office furniture and safe	600 00		
" Clydesdale Stud Book	1,800 00		
	$66,687 77		66,687 77

To the Council of the Agriculture and Arts Association :

GENTLEMEN,—We, your Auditors, beg leave to report that we have examined the Treasurer's books and accounts and find them correct, with vouchers for the same.

There are outstanding cheques amounting to $36.00.

JOSEPH BIGELOW, } Auditors.
JOHN I. HOBSON, }

TORONTO, January 3rd, 1891.

IV

THE DAIRY AND CREAMERY ASSOCIATIONS.

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I.—DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO.

OFFICERS FOR 1891.

President, - - - - - - - Wm. Eager, Morrisburg.

1st Vice-President, - - - - - - Platt Hinman, Grafton.

2nd Vice-President, - - - - - - Wm. Bissell, Algonquin.

Directors :

Division No. 1.—E. Kidd, North Gower.

Division No. 2.—John McTavish, Vancamp.

Division No. 3.—Richard Murphy, Elgin.

Division No. 4.—D. Vandewater, Chatterton.

Division No. 5.—T. B. Carlaw, Warkworth.

Division No. 6.—H. Wade, Toronto.

Secretary, - - - - - - - Harford Ashley, Belleville.

Treasurer, - - - - - - - P. R. Daly, Foxboro'.

Auditors, - - - - - - J. G. Foster, Moira.
M. K. Evertt, Easton's Corners.

LIST OF MEMBERS

FOR 1891.

NAME.	POST OFFICE.	NAME.	POST OFFICE.
Alexander, A.	Napanee.	Faucet, Arthur	Bishop's Mills.
Alexander, Jas	Montreal.	Foster, J. G	Moira.
Ashley, Harford	Belleville.	Forester, Nelson	Lyn.
Ayer, A. A	Montreal.	Frost, F. T	Smith's Falls.
Bailey, Arthur	Campbellford.	Gardner, O. L	Lyn.
Bissell, Jas	Brockville.	Garrott, W. W	Tweed.
Bissell, Wm. J	Algonquin.	Gerow, W. F	Napanee.
Bissell, Howard	Brockville.	Gilroy, Craft	Glen Buel.
Bissell, A. P	"	Godkin, G. E	Waterdown.
Brenton, F. W.	Belleville.	Gould, W. J	Elgin.
Brown, W. A	Carleton Place.	Hinman, P	Grafton.
Bush, O	Kemptville.	Hicock, W. W	Sweet's Corners.
Burnie, Matthew	Spencerville.	Jelly, Robt	Jellyby.
Campbell, A.	Ormond.	Johnson, H. M	Cherry Valley.
Carlaw, T. B.	Warkworth.	Johns, A. C	Fairfield East.
Chipman, Wm	Ottawa.	Jones, Andrew	Maitland.
Cleal, George	Selby.	Keating, Jas	Lansdowne.
Cummins, Jas	Lyn.	Keeley, J. D	Railton.
Cunningham, R. W	Gananoque.	Kidd, E	North Gower.
Daly, P. R.	Foxboro'.	Ketcheson, Jas	Belleville.
Dargavel, Jno. R	Elgin.	Lane, Jas	Pittsferry.
Davis, A. A	Brockville.	Lavine, Frank	Elgin.
Daugherty, W	Napanee.	Legge, Joshua	Gananoque.
Dempsey, W	Belleville.	Madden, E. J	Newburgh.
Eager, Wm.	Morrisburg.	Murphy, R. G	Elgin.
Eager, Geo	Kemptville.	Metzler, Robt	Odessa.
Earl, J. S.	Belleville.	Moore, W. A	Perth.
Earls, R.	Algonquin.	McCready, R	Lyn.
Eastman, Thos	Vernon.	McDougall, A. D	Brockville.
Evertt, M. K	Easton's Corners.	McLean, D	Eric.
Eyre, Geo	Lyn.	McTaggart, Samuel	Belleville.

LIST OF MEMBERS—*Continued.*

NAME.	POST OFFICE.	NAME.	POST OFFICE.
McTavish, John	Vancamp.	Soper, H. L	South Mountain.
Publow, G. G	Perth.	Smith, Henry	Harlem.
Purvis, A. P	Maxville.	Stillman, J. H	Campbellford.
Potter, Arthur	Mountain View.	Tallman, Chas	Kilmarnock.
Ragsdale, W. J	Bishop's Mills.	Thompson W. H	Prescott.
Reddick, J. A	Lancaster.	Thompson, R	Napanee.
Robinson, G. H	Morin.	Vandewater, D	Chatterton.
Rollins, Robt	Madoc.	Whalen, Wm	Centreville.
Spence, Hugh	Norwood.	Warton, W	Selby.
Spence, S. S	Cottesloe.	Wilson, Jno	Maitland.
Strong, P	Brockville.	Wade, Henry	Toronto.
Stagg, Jno	"	Whitton, Jas	Belleville.
Stringer, R	Sand Bay.		

FOURTEENTH ANNUAL CONVENTION

OF THE

EASTERN DAIRYMEN'S ASSOCIATION OF ONTARIO.

The Fourteenth Annual Convention of the Eastern Dairymen's Association of Canada, was held in the Court House, Brockville, on Wednesday and Thursday, January, 8th and 9th, 1891. The President, Mr. JOHN T. WARRINGTON, jr., of Belleville, took the chair at ten o'clock, and called the Convention to order.

ADDRESSES OF WELCOME.

Mr. D. **DERBYSHIRE**, Mayor of Brockville, in welcoming the Association to the town, spoke as follows: As Mayor of this Island City it is my pleasant duty to extend to you a hearty welcome. It should be a source of pride to any community to have the privilege of affirming its hospitality to so distinguished a body as the Dairymen's Association of this province, and although this is only the Fourteenth Annual Convention, yet you are scattering your permanent blessings throughout Eastern Ontario, and exerting an influence far beyond our borders. Well do I remember the early struggles of this Association, when a few patriotic men put their hands into their own pockets to pay the expenses of carrying on our annual and other meetings. Now you are aided by the Ontario Government, who also print your annual reports, and you have the influence of the whole people. Fourteen years ago we had the common butter and cheese that anyone could make, and everybody against us; while to-day, thanks to the good work of the Dairymen's Associations, we make the finest cheese in the world. What means this rapid progress, unless it be the adaptability of this province to the butter and cheese interests and the earnestness and ability on the part of those engaged in its manufacture, aided by this Association and the Government? To-day we stand in the very front. No association of men has done more for every citizen in this province, than the Dairymen's Associations. We can congratulate ourselves that the dairymen of Ontario were the first in the whole world to employ instructors and inspectors. Dairymen in other parts are now following our example, and coming to Ontario to get its instructors. We congratulate ourselves that Canada has the best reputation for making fancy cheese. We have to thank this Association for the plans formulated and carried out, and for the high and enviable position that we now occupy. I trust that you will take hold of the work and make this the finest meeting yet held. It is justly a source of pride to Leeds and Grenville to have among our citizens some of the oldest and most enthusiastic dairymen in the province; those who are alive to all the modern improvements in the manufacture of cheese; those who are aiming to keep this province abreast in this important enterprise. You will have their cordial support and earnest attention. I trust this community will respond liberally to your call for membership, and that you will be instrumental in impressing upon more of our farmers, the need of better stock, more improved appliances, and a more thorough understanding of the dairy business. I sincerely hope that your pleasure in meeting with us will be as abundant as the welcome we extend to you. I hope that your meeting will be pleasant and profitable and one long to be remembered by your Association.

Mr. D. W. **Downey**, President of the Board of Trade, briefly addressed the convention in words of welcome. He spoke of the importance of the dairy interests to the province, and also pointed out the influence of the make of Ontario cheese on the British markets. He looked for a still greater improvement in the quality and quantity of cheese made in the province.

Mr. H. F. J. **Jackson**, a member of the Board of Trade, said he regarded cheese as the staple product of that portion of the province. Twenty years ago the farming interests of the section were languishing in the production of corn, barley and wheat, but the manufacture of cheese had revived the condition of agriculture. He joined in welcoming the gathering.

Mr. **John R. Reid**, Secretary of the Board of Trade, said he had a friendly feeling towards the cheese industry, having been engaged six years in the produce business, and he had still an interest in the cheese industry. The dairy industry was indeed a tower of strength to the country. Phenomenal progress had been made in the cheese business of the province, and Ontario was now said to be leading the van. At one time the Americans pointed the finger of scorn at Canadian makers and their product, but the tables had been turned. Canadian cheese was now as good as any made in the world. He extended a cordial greeting to the members of the convention.

Ex-Mayor **Dana** referred to the large amount of money brought into the country by the cheese industry, and welcomed the visitors.

Mr. A. D. **McDougall** re-echoed the words of welcome spoken by his fellow townsman. Personally he was largely interested in the cheese trade, and had been so for nineteen years. He had started as a manufacturer. He had learned much that was valuable about cheese making at the conventions of the Associations. He could cite factories which had been benefited to the extent of cents—not a cent—on the pound. In fact a man had told him that day that his profits in cheese-making had been doubled by the instruction received at the gatherings of the Association.

The **President** responded to the addresses of welcome, thanking the speakers for the warm greeting extended to the members of the Association.

THE PRESIDENT'S ADDRESS.

Mr. **Warrington** then proceeded to deliver the annual address of the President, as follows: It gives me great pleasure to have the honor of occupying the position I do today. I trust that this, the fourteenth annual convention of the Association, will prove even more successful than any of the previous conventions, and that every cheesemaker and every factoryman and all interested in the dairy products of Canada will leave Brockville satisfied that the information they have received well worth the time and money they have expended, and, as Mr. Evertt happily put it last year, "It was good to have been here." In view of the heavy amount of business to be got through, I will make my remarks as short as possible. In the first place I cannot praise too highly the manner in which the inspectors and instructors have done their work. Mr. Bailey's section, Belleville proper and Peterboro district, has not required so much instruction, but the number of people found guilty of skimming, stripping or watering their milk is astounding. Mr. Rollin's section, Kingston and Prince Edward, may not have had nearly the same proportion of adulterated milk cases, but I can speak from personal experience of the marked improvement in the quality of cheese made in those sections under his instruction and I am glad, especially, to see Kingston coming to the front again. I remember the time when cheese made in Kingston section was considered to be the finest quality turned out in Canada and they commanded the highest price of cheese made in any section. With regard to Messrs. Publow and Ruddick, they have not come under my personal supervision, but from all I can learn they have been as zealous in their duties as Messrs. Bailey and Rollins. One of the most important things to be considered here at this convention, in my opinion, will be the subject of winter dairying. It is my firm conviction that the cow can be utilised as a money-making animal for two or three months longer than she is under the present system, and that, without any detriment to her, and I trust that Prof. Robertson will give us his views on this matter. I have two suggestions to make which I think will improve the sale of cheese. The one is the marked improvement in quality that can be seen in any factory where the cheese is kept 48 hours in the press. A large number of factories about Belleville have pressed their cheese for 48 hours this year, and there has hardly been a cull found among them. In Mr. Carlaw's factory where this 48 hour pressing system was practiced, 258,000 pounds of cheese were made and there was not a single complaint made of a poor cheese. Another thing I would suggest is that the cap cloth be not taken off the cheese when shipped out of the factory. I have had frequent complaints about blackened surfaces on this account. These cap-cloths can be bought ready cut round, at a very reasonable rate from any dealer in factory furnishings. I am just in receipt of an estimate of the stock of Canadian and American cheese on the first day of the year, and I am pleased to inform you that the visible supply is 150,000 less than the same date last year. This promises well for a good demand for your early makes. Trusting this may be so, and with every good wish to you all for a happy and prosperous year, we will now proceed with the business of the convention.

COMMITTEES.

The following committees were then appointed :—

Business—W. Eager, D. Derbyshire and W. Bissell.

Nominations—P. Hinman, D. Vandewater and H. Bissell.

Dairy Utensils—R. Rollins, J. A. Ruddick and G. G. Publow.

Finance—H. Wade, T. B. Carlaw and P. Hinman.

Legislation—H. Wade, D. Derbyshire and Prof. Robertson.

MAKERS, MAKING AND COMPETITION.

Mr. Howard Bissell, of Brockville, was requested to address the meeting in the absence of speakers delayed by the train, and delivered the following extempore address :— I congratulate you, Mr. President, upon being one of the largest exporters of cheese to Great Britain. I feel at home on this subject of the manufacture of cheese, and I believe that both buyers and makers will agree with me when I say that there has been remarkable progress in the industry during the past ten years. And I have not the least doubt that this good result is chiefly caused by the holding of conventions of this and sister associations. I am looking for further progress. But I can plainly see that Ontario must look at the fact that the Lower Province is going to compete very closely with us before long. I had the pleasure lately of attending a dairymen's convention at Cowansville, in the Eastern Townships. It was the first convention of the sort ever held in that section, and it was a success. I spoke there upon the subject of winter dairying, and soon found that they were alive to its importance, and that we must be prepared for their competition. We have also competition across the river. Last September I was in Fulton county, N. Y., and saw September and October cheese sell for 8⅝ to 8 4-5 cents per lb., while the cheese in Brockville was selling for 9⅝ to 9¾. We may well feel proud of the position we hold at present, but we must not forget that our American neighbors are also putting forth an effort to overhaul us, and some of our best makers are being enticed across the line. They can sell cheese higher at Ogdensburg than they do at Utica because they have Canadian makers, and they will soon be here in this district for more of our best men. In Quebec they are also sending for our makers. Speaking of makers reminds me of the fact that there are some men who imagine that they can learn to make cheese in one year. A maker should study at least two years before he should undertake the charge of a factory, and then he will have a great deal yet to learn. Too many cheesemakers are anxious to make money at the business before they are fully equipped for the work. I believe in employing good makers and giving them good wages, and if a man is a first-class cheesemaker he is deserving of a good price for his work. It is a deplorable fact, however, that some makers cannot make good cheese, and there are too many miserably built and equipped factories in Eastern Ontario. This "cent a pound" business is a great evil. No man can make good cheese if he is paid only a cent a pound. I attended a meeting at North Augusta, where it was announced that a man would tell us how to make cheese at a cent a pound. The man who called the meeting said that if they would guarantee the milk of 200 cows the cheese would be made at a cent a pound. I asked him for his figures, and he said he had not any figures, but that they were making cheese for a cent a pound all over the province. I then asked him how much cheese the 200 cows would produce, and he replied 40,000 lb. I told him that at a cent a pound that would give only $400. I followed up my question by another regarding the wages paid for a maker. I was told that it would be $300. Now, that left $100 only for building the factory, putting in machinery and other expenses. Then I gave him 60,000 lb. for 200 cows, and after estimating the cost of manufacturing, interest on investment, etc., brought him in $297 in debt. (Laughter.) This matter of poor buildings and poor wages needs to be talked about plainly. When I was on the road as instructor I had a good deal to contend with, as the cheesemakers were prejudiced. Some of them would hardly allow me to give instruction. I also found a difficulty in getting a chance to properly inspect the milk. Now the Dominion Government is assisting in the work of analysis, etc., it is easier to deal with the question of adulteration.

Mr. R. G. MURPHY, Secretary of the Brockville Dairymen's Board of Trade, was next called upon, and said: I agree with the remarks of Mr. Bissell regarding the manufacture of cheese. I am a partner in quite a large factory, and my experience in regard to the prices paid for making cheese may be worth repeating. We took hold of a large joint stock factory, and in our section of the country they have not proved successful. The principle may be correct, but in practice they have invariably failed. We bought out the stockholders and rigged up the factory in first-class shape. But other factories were all around us. We were, so to speak, the hub, and at the other end of the spokes were factories making cheese at a cent a pound, and we were in competition with all of them. We paid more money for making than the other factories did, and found patrons. We succeeded admirably, and the cheese made pleased the buyers, while at the same time we paid as much to our patrons as those factories did which were not paying their makers so high. It pays to rig up factories in better shape and pay more for making. The patrons will soon help to pay men for any improvements.

A MEMBER—What did you pay a pound?

Mr. MURPHY—A cent and an eighth. We declined to run the factory at the prices prevailing around us. At first it was uphill work, but we have succeeded in keeping our patrons and paying them good prices for their milk.

A MEMBER—How do they manage to draw the milk?

Mr. MURPHY—Each man draws his own milk, and every one may bring it in his own way.

Mr. DERBYSHIRE—I have been delighted with the very practical addresses given this morning. This afternoon the speakers advertised will be present. We are proud of the Brockville district as being the home of the pioneers in this great cheese industry.

We have now in this section many factories well equipped, and more are continually being built, but Mr. Bissell's factory, five miles from here, is, I believe, the finest in Ontario to-day. Messrs. Murphy and Dargavel have paid a good price for making cheese, and, although so far they may not have cleared much, they have made a reputation as handlers of the finest cheese. Our people are bound that we shall put up good factories and pay a decent figure to first-class makers, for it is only in that way that we can maintain the splendid record we now have. Good cheesemaking cannot be expected at a cent a pound. Our neighbors are waking up all around. Even across the line, in St. Lawrence county, they have hired some of the best makers from here. They are willing to give more money than we will pay if we continue to hire at a cent a pound.

The meeting then adjourned until the afternoon at 2.30.

FIRST DAY.—AFTERNOON SESSION.

The Convention met again at the appointed time, the President in the chair.

THE PRESENT STATE OF DAIRYING IN THE PROVINCE.

Mr. M. K. **Evertt**, an ex-president of the Association, was called upon for an address, and said: I have been much pleased with the character of the addresses delivered at the morning session. I regard dairying as the leading industry of the Dominion. In order to beat the world, as we have done, or even to keep pace with other countries, we certainly will have to look sharp to our business, and lose no time in producing milk more cheaply and turning out a finer grade of goods. This is a question that is stirring the minds of many thoughtful farmers. If the patrons have not been getting good prices for their cheese about the first place they begin to cut down expenses is in the price paid to the maker. But they are beginning at the wrong end. I repeat that what we have to do is to produce the milk more cheaply. Other countries are beginning to feed cheaper fodder to their stock, and so must we. Some claim that the bottom is falling out of the cheese business. I claim that the dairy industry was never in a better position. The bottom is dropping out of the old plan of feeding and caring for dairy cows, and out of those cows which are not producing the amount of milk a good dairy cow is expected to produce. Factory men are doing all they can to turn out the best goods. Bettter buildings are steadily being erected. We have led the world since 1884, and we shall continue to do so. (Applause.) The mayor said to day that the reason St. Lawrence county, N.Y., was turning out so good an article was because they were getting our makers. Canadian boys have gone to New Zealand and to the Old Country to teach the people how to make first-class cheese. It is the duty of the farmers to come to the rescue of the men who are building up this business, as we cannot afford to take a second place in the manufacture of cheese. I know there has been a very great improvement in the quality of cheese in what is known as the Brockville section this season. We are advancing very fast. I have been able to make and sell $110,000 worth of cheese. Out of that amount I have paid to two factories $46,079.22. Of the $25,000,000 worth of cheese imported by England, Canada sent $10,000,000 worth. With proper treatment and feeding, and using the silo, we should send $20,000,000 instead of $10,000,000. Our return, as regards the value of our milk product, is very meagre, compared with that of Denmark, a country not so large as Ontario. So the question crops up again, how shall we get more milk for less money? Some people say we cannot compete with the west, because there they have food and grasses at all seasons of the year. I hold that the man who has a silo has the far west at his own door, in a compact and convenient form.

THE BENEFITS OF ASSOCIATION WORK.

Mr. D. M. Macpherson, an ex-president of the Association, was also called upon, and remarked: I believe that this dairy interest is to-day superseding every other industry of the country, and in the quality of its cheese and the talent of its manufacture Canada is surprising the nations of the world. In order to keep our proud position we must continue to put science, pluck, intelligence and energy into our work. I was pleased to learn from the last speaker of the high standing Canada has attained in dairy products, particularly in cheese. I can certify to the truth of his assertions. We have not only a good reputation, but we are receiving the advantage of that high reputation, and no individual or nation can gain a reputation for making an article of superior quality without receiving some benefit therefrom. The dairymen of Canada are to-day receiving the reward of their industry. But we must not dream of resting content with our laurels, but go on improving. To cease making progress is to fall behind. Others will go forward with improvements and take our place at the front. We must take advantage of every means to hold our lead, and nothing has contributed and is contributing more to raise the reputation of Canadian dairy produce than the meetings of the Eastern and Western Dairy Associations of Ontario. The interchange of opinions, the results of observation and experiments by our best men are invaluable. The work of these Associations is to-day more popular than ever before, not only with dairymen themselves, but also with the Government. The Government has seen fit to subsidise our efforts very handsomely indeed, and great credit is due to the administration of the province for its liberal assistance in enabling us to carry out the good work planned by these Associations. There are some things, however, in which we can make advances, but I will do no more just now than throw out a few suggestions. I believe that in too large a degree the work of the inspectors has been extended over too wide an area. Yet the good results are so apparent that I believe the Government would be justified in at least doubling its subsidy to the Associations, and increase the grant to $3,000 or $4,000. (Applause.) I have found from experience that the great drawback to-day is the large extent of territory we have to cover. It is too great for a full measure of success. We should have smaller inspectorates, so that the inspectors may have opportunity of visiting the factories oftener and keeping a closer oversight of the manipulation of cheese. We can recognise it as a fact that this system of sending out instructors has been one of the grandest things we have accomplished. It has brought to the manufacturers of cheese the best skill and experience, and has shown them the benefits following the putting of that skill and experience into work. We must further strengthen and systematise this work of inspection and instruction, so as to accomplish even more in the future. It is a certain means of bringing efficiency into our factories and a higher level to the quality and reputation of our product. We must strive to bring each individual factory up to the high standard already attained by the best factories, and in doing that we will raise the reputation of the product of the whole country and increase its value, meet the growing demand for first-class cheese, and lead the world in the future in even more marked a manner than we have done in the past.

WINTER DAIRYING.

Prof. Robertson, Dominion Dairy Commissioner, was next called upon, and after congratulating the Association on its good record and the town upon its enterprise in the matter of handling cheese, proceeded to say: I was very glad to learn from the remarks falling from the lips of Mr. Evertt that he was preaching that good gospel of people minding their home end of the business first. I thought as I listened to him that if he took pattern by many dairymen I know of, he would have been running down the cheesemakers, the salesmen, the buyers, the Government, the old country market, the Association, and in fact everything but his own carelessness. It is a good thing for a man to remember that the most important part of his business is his home end of it, and that he cannot improve matters by paying too much heed to the market end of it. In looking over this large audience I find what I expected to see—representatives of all those engaged in this cheese business, now not only a large industry but the best paying one in our province. I find the farmer, the maker, the local buyer and the large exporter here. To each one of us an advantage must come in considering how we can improve our business for ourselves at the home end and not at any other man's end. I cannot accomplish much in striving to instruct a dairyman how to improve his circumstances if all the time I am directing his attention to the man in Montreal who sends back for a rebate of a half or quarter a cent. per lb. on ten boxes. And when I speak to cheesemakers it will not be about those ends over which they have no control.

From my standpoint, as Dairy Commissioner for the Dominion of Canada, I have some plans under consideration, by the carrying out of which I hope to help very materially the cheese business during the coming summer. Meanwhile I would like to notice that all over this province of Ontario we have very many more cows to the square mile than they have anywhere else in Canada. When population is of the right sort, it is an important factor in the success and prosperity of a district, and it is generally a good indication of the value of property. It has been estimated that each new immigrant is worth $1,000 to the country,—but that is only one kind of population. A large cow population also means wealth and permanent prosperity, for where the number of cows is increased, every township, town and county in that immediate district is bound to get the benefit of their productiveness. Wherever you find an influx of producers giving out more than they take, there is thrift. In every part of Ontario where there is arable land there should be four times as many cows kept as are now owned. We should keep 25 cows on each 100 acre farm. This would mean more money in circulation. I want to say a few things as to how this can be done in Ontario. Owners of cattle must learn what immense value lies in the corn plant. Some people think that when a man begins to talk corn, corn, corn, that he has corn on the brain. But let me tell you that until a man gets cheese on the brain he never wins prizes or gets the first call on the cheese board. (Applause.) I would like to get in every township men who are regarded as cranks on corn, and this would do the township more good than the presence of men who are willing to be exhorters on the political hustings. Corn is one of the hardiest growers of any plant cultivated on the farm. It is easier to grow, and it suffers far less from parasites. People thought for years that the corn crop was adapted for the southern or middle states, but that it could not succeed in Canada. I have never seen a farm in Ontario that had not some land suitable for a fair crop of corn. During the last season on the Experimental Farm at Ottawa the cost of growing a crop of corn, counting the rent of the land, the cost of the manure ($\frac{2}{3}$ value), cost of seed, labor of filling the silo, etc., was $1.34 a ton. We are feeding cows on fifty or sixty pounds of corn ensilage a day and they are thriving upon it. We will be feeding some steers also on corn ensilage alone, and I know that they will do well on sixty pounds a day. Fifty pounds of ensilage costs about 3½ cents, and the manure is just about worth the work of feeding. You will readily perceive that a farmer can winter just four times as many head at 3½ cents a day each as he can if the feed costs 14 cents a head, as it ordinarily does. This is one way in which a man can increase the cattle population —four times the number of cows can be wintered at the same outlay. Sixteen tons per acre of corn is a reasonable yield, and that quantity will winter, so far as fodder is needed, four cows for five months and a half, while an acre of average hay will not carry one cow through the winter. And the farmer will not only feed his cows more cheaply on ensilage, but he can have more on the same acreage. I know of one case on this continent where a firm keeps 258 cows on 204 acres of land and buys little feed except cotton seed meal and bran from the proceeds of the skim-milk. Everyone cannot do that, but most dairymen could keep 25 cows per 100 acres. That is four times more than is the average. I am in this matter advising what every man can do. If I advised a man to hold back his cheese, it might be that the market price would come down and he would blame me for giving him wrong counsel. But there is no such risk in recommending the growing of corn for winter feeding. You may put this first of all, that the man who grows corn for the making of ensilage should try to grow that corn in rows or hills, so as to admit of plenty of sunlight and a free circulation of air.

A Member.—Do you believe in the rows being far apart?

Prof. Robertson.—About 3 or 3½ feet apart. Grow your corn in rows about that width apart so as to get broad leaves, and lots of them. If you grow corn too close together the leaves will be white and delicate and the whole plant will lack vigor. The nutritive qualities of corn as shown by analysis, are in these proportions: Nearly one-half are in the leaves, about one-fourth in the stalks, and the remaining fourth in the nubbins. I had this tested by selecting 160 plants from different parts of a twenty acre field, grown for ensilage, and it was found that about one-half of the food value was in the leaves. I say, then, let your corn get plenty of light and air, for a plant grown in the dark or crowded too closely to others is bound to grow spindly and weak.

Now, as regards the erection of a silo. I believe a man should build his silo inside his barn if he already has room for it. There is no offensive smell from ensilage. I can put it in my pockets or handle it with my hands, and no bad odor from it will attach to my person. There is no putrid matter about it. The ensilage will keep against single boarding, but not as well as if there are two thicknesses of lumber with tarred paper between. It pays also to have the corners filled by having a bevelled board put in. The triangular space behind it should be filled up with sawdust. If air can be excluded no mould will form; and your chief object should be to so fill the silo that no air can get into it. The corners filled with sawdust give the best results. I do not think any extra good results from coating the lumber with tar or crude petroleum. I question the advisability of putting any preservative on the inside. My friend, Mr. Fisher, M.P., who is here, has had considerable experience with wooden silos, and at his place I saw one silo six years old which did not evidence any signs of decay. In the covering of the ensilage, I have not found much that is new. This year we had one silo covered with six inches of cut straw and eighteen inches of long straw, and there was not more than an inch of waste.

A Member—Do you cut the corn with a straw cutter?

Prof. Robertson—Yes. Our past experience has shown us that where corn is put in the silo uncut, there is always a waste at the butts—where the ends come against the wall. The full corn stalk is very hard to handle, difficult to feed, the cattle will not eat it up so clean, and there is therefore more waste. To those who desire to have their cows give a large flow of milk during the summer, I would say that your best practice is to feed the animals well all winter. If a cow is fed dry fodder all winter, she will give less milk when fed on succulent grass, because of that poor feed in the previous winter months. It is a great gain to feed a cow all winter on this succulent corn food from the silo, so that her system will be kept in a more relaxed condition.

One of the things that comes within the control of the farmer himself, is the making of his stables more comfortable. I do not know of any subject which has been more neglected than this very important one of constructing cattle-sheds and stables that will be comfortable and convenient and fully adapted to the requirements of the farm. Some of the places used for these purposes are most unsuitable. This means loss of vital power in the cows and less milk. I would have my cows kept warm whether the air was pure or impure, looking to the matter of production. There has been a craze in some quarters for ventilation, but in our climate, if you ventilate a stable as many do with the thermometer 20 below zero, the cows will not enjoy the ventilation. (Laughter and applause.) It is a good thing to have a barn well ventilated, but if we are to have one of two evils, it is better to have the warm stable that is not too well ventilated. In a warm stable not well ventilated, there will not be an offensive odor if you use gypsum.

A Member—What about dry earth?

Prof. Robertson—The dust is not so active, and gypsum makes the very best manure. I have time only to mention the next point, the benefit of having the stables convenient. Much waste of time and valuable manure results from having the stables badly placed. The four conditions requisite for success in handling dairy cows are succulent food, a comfortable place to live in, plenty of water and salt, and kindly care.

As I said near the beginning of my address, too many farmers are looking to the cheese and market ends of the business for their profits instead of saving in the cost of production and in the by-products. If men will take care of the manure instead of letting it leach, it will mean practically one cow more on the acre of corn grown. Comfort, convenience and compactness, with every device for saving the manure should be considered.

Some farmers are becoming just a little bit disgusted with our glorious cheese trade. If I were living on a farm trying to make money by sending milk to a factory, I too would soon become convinced that milking cows was not a delightful occupation when my cows gave me back less than 3,000 ℔. of milk from which I got less than $24 a year. If cheesemakers would give a little more attention to helping farmers to enlarge their capacity in these little things, they would not complain that the farmers were trying to get the last cent out of them. Farmers are finding it so hard to make ends meet and get cheese-making to pay, that they must try to get what they can from everyone. Cows should give 7,000 ℔. of milk for a whole year. If you can show a farmer how to get 7,000 ℔. of milk from his cow, which means $32 more per cow, he is not going to begrudge the maker $1.75 more for making the 700 ℔. of cheese. The quarter of a cent per ℔. extra would pay every factory owner so well that he could afford to paint the factory inside and out. I find that a great many men are trying to console themselves with the idea that they are doing a benevolent thing in keeping cows that give a small quantity of milk. I have heard men talk as though they were the neighborhood's benefactors—so kind, generous and charitable. They said in effect: "Because I send less milk it is therefore all the richer, and my neighbors get the advantage of that richness." This is one of those well gilded fallacies that people are only too willing to swallow in preference to the truth. The quality of a cow's milk as regards the solids, is nearly always controlled by its breeding, and the quantity and flavor of the milk by the feeding of the cow. If you can make a cow give you 30 or 50 ℔. of milk per day, the larger quantity of milk has just as good and perhaps a better flavor. It would pay every patron of a cheeese factory to have a pass book or ruled sheet for each cow, where a record could be kept for every day in the week. An examination of that record once a day for a week would show what each cow was doing; the man who did that would be a benefactor to his neighborhood.

The home end of the business for cheesemakers is the next point. The important end of the cheesemaker's business is essentially his factory. Every cheesemaker knows in theory that no man can make fine cheese out of impure milk. Every cheesemaker accepts that as a part of his creed. A great many makers bend their energies mainly to scolding factory patrons for not sending pure milk. But they sometimes neglect to furnish a good example, and a good example goes a great way in influencing a neighborhood. Whenever I go to a cheese factory and find the weighing can to be just as bright as hot water and elbow grease can make it I see the milk cans on the waggons in the same condition. And when I find the cheese factory cans dirty, the patrons' are much the same. I have learned that it takes just half as much work to keep a can wholly clean as it does to keep it half clean. Many farmers do not strain their milk. Out of a number of farmers whose milk was recently examined 47 had sent an article which had never been hindered by passage through a strainer. If a man sends a can of unstrained milk the maker will soon remedy the matter if he will put a note in the can when it is returned, to this effect: "I am very sorry to see that some one forgot to strain your can of milk this morning." This note would not be kept on show as school boys keep their cards of honor—(laughter)—but it would have a good effect in the home end of the business. If this were done five-sixths of the off-flavored cheese would not be found.

A Member.—What is the best article to strain through?

Prof. Robertson.—I would prefer a wire strainer for the farmer, and a cloth one for the cheesemaker at the factory.

A Member.—I prefer Canton flannel.

Prof. Robertson.—I have found that where a cloth is used by the farmers, five-sixths of them do not smell sweet. And I would say further that the cheesemakers must keep every article in the factory clean. A few years ago when I addressed gatherings of dairymen I used to speak of the fat globules, coagulation, casein, rennet and all that. But now, I deem it better to tell the cheesemakers that the main trouble with the Canadian cheese industry is that the factories are not kept quite clean enough. It is worth more to a cheesemaker to keep his factory clean every day than to be talking and studying about fat globules, etc. I do not believe that the factories are as clean now as they were when I made cheese twelve years ago. If cheesemakers will pay more attention to cleanliness, and finish the job right to the end by having neat looking boxes just the size to fit the cheese, and each with its exact weight stencilled upon it, and if they will persevere to the end and work in their own sphere, they need have no fear of the result.

A Member.—How can we secure the kind of corn that will grow the greatest amount of stalk and leaves, and mature at the most favorable time?

Prof. Robertson.—I consider the Thoroughbred White Flint the best.

A Member.—Have you tried the Red Cob?

Prof. Robertson.—Yes. I fear, however, that the Red Cob does not ripen early enough with us for filling the silo.

A Member.—What variety has the most leaves?

Prof. Robertson.—I believe all the large ensilage corns have broad long leaves in plenty.

Mr. Whitton.—Have you ever tried mixing with native corn?

Prof. Robertson.—Not with the same sowing. Why?

Mr. Whitton.—I tried it this year and found good results from it. The Canadian corn matures earlier and helps the other varieties which are rather green and do not fully mature.

W. J. Bissell.—We filled our silo with Canadian and Southern Sweet ensilage mixed together. We find more ears on our own common corn, but not so much stalks, and by mixing the two varieties together we get the very best results.

Prof. Robertson.—The best varieties of corn for ensilage in Ontario are the largest growing sorts which grow to near maturity. One half the acreage should be planted with the large growing sorts, Thoroughbred White Flint, Mammoth Southern Sweet, Red Cob, Giant Prolific Ensilage, and the other half with an earlier ripening variety.

A Member.—How far would you have the rows apart?

Prof. Robertson.—I would have the rows at least three feet apart, and so as to have the stalks from four to eight inches in the row. I would harrow the corn just when it is coming through when the weeds are coming up. That would kill about one-fifth of the plants but you can spare that. If you can get corn to grow well the first four weeks it is in the ground it will take care of itself after that, in most seasons.

A Member.—How do you harrow—across?

Prof. Robertson.—Everyway. It does not matter.

A Member.—Would you make every silo with perpendicular walls?

Prof. Robertson.—So far we have made them perpendicular, and I would not approve of building them a little wider at the top. I cannot see where there is much loss in the perpendicular wall.

Mr. Thompson.—I read an article a short time ago which said that cotton seed meal fed to dairy stock improved the milk.

Prof. Robertson.—In the case of some cows, extra rich feed like cotton seed meal or pease meal will make richer milk, but as a rule the breed has the greatest influence on the per cent. of solids. The feeding of cotton seed meal is a capital practice, if only to get the excellent manure, but I would not feed more than 1½ lb. per day.

A Member.—Do you approve of any particular kind of grain for feed?

Prof. **Robertson**.—For economy in Ontario forty lb. of ensilage, five lb. of hay or straw, four lb. of mixed barley and pease and two lb. of bran and one lb. of cotton seed meal is a reasonable daily allowance. The cheapest grain this season is the mixture of barley and pease. I would also advise early sowing of grain. We have had six plots sown in the spring, each one a week later than the other. The first and second sowing of barley gave at the rate of nearly sixteen bushels to the acre more than the third plot sown a week later. So those of you who keep cattle for profit should sow your grain early in the spring, and that means that your plow should be going steadily in the fall.

Mr. P. **Hinman**.—We sowed our Red Cob corn perhaps a week earlier than usual in order to avoid frost. It ripened so thoroughly that for a week or two before we put it in the silo there was plenty to roast or send for canning. That sown later was not very good. It escaped the frost in the fall, but there appeered to be two or three weeks difference in the time of ripening although only about a weeks difference in the planting.

Prof. **Robertson**.—We tried planting corn on successive dates, with a week apart and we found that the earliest sown gave us the best quality, but not the most in quantity on account of the frost. It is a good thing, however, to get a big root to the plant. I would prefer to sow half a bushel to the acre and harrow ; but if I did not harrow I would not use so much seed. The proper time for cutting is when the corn is glazing, or when the leaves are turning yellow. If every second stalk carries ears you have a good crop.

A **Member**.—What size do you cut the corn ?

Prof. **Robertson**.—I prefer an inch, but I have found that two inches will also do. The cattle will eat it.

Mr. H. **Bissell**.—What about feeding the ensilage when there is a good deal of acid in it ? Is there any such thing as sweet ensilage ?

Prof. **Robertson**.—When the corn is cut it should be left in the field two or three days, and then it will keep for two or three years. I have never seen ensilage entirely free from acid. It does not do for corn to be put in too green, or it will develop lactic acid or the acid of sour milk, which is very offensive.

Mr. **Ashley**.—Would you put water on it if too dry ? I did so this year.

Prof. **Robertson**.—If the corn was too dry I would put water on it.

Mr. H. **Bissell**.—The reason I asked if there was any such thing as sweet ensilage was because some people will smell the corn and say it is sour when there is nothing more than a brewery smell to it

Mr. **Keeley**.—I filled my silo last year and followed the advice then given about feeding. I began feeding the cows in January, giving them a little ensilage only. At that time the animals were in good shape. They calved in February, but kept going down, although I also gave them all the hay, straw and roots they would eat. They got poorer and poorer, and I never had a thin cow before. But this year I had the same silo and the same ensilage, and I fed them all the corn they could eat. I went up to the silo one day and it fell in five or six inches. I felt like swearing—(laughter)—and had hard work to keep from falling a second time. But from that silo I have given my cows all they could eat—they will hardly eat anything else but ensilage now—and to-day I have the plumpest and thriftiest looking cows in the section, and have also sold my milk and butter for more than anyone else in the neighborhood. I have fed ensilage straight, and nothing but ensilage. My corn got the frost before I could cut it this year. We commenced to fill on the 16th of September and it got the frost, and I was afraid it was not going to be a good year. But to-day I am proud of the appearance of my cattle.

Mr. **Ashley**.—I had a case last year somewhat similar to Mr. Keeley's. I found that my cows would not eat the ensilage, which was a part of their allowance. I left the ensilage in the silo, and the cows are now eating it freely. That silo settled half way down, and was being continually filled up. It settled nearly to the ground in the corners, and this year while tramping it my man went down through a hole and I could not account for that. The silo was sheeted inside and covered over with tarred paper and matched lumber and covered over with hot tar. I cannot account for its settling down so, and why the cows will eat this year whcn they would not do so last year.

Mr. Carlaw.—I was one of the first in the Peterborough district to try the silo. If the corn is well tramped in the silo it will remain sound. Mr. Ashley must have had a lazy man. (Laughter.) I get all the ears and all the stalks I can. I mix Crompton's Early and the Mammoth Southern Sweet or Red Cob. I have not raised more than fourteen tons to the acre of the varieties I have named, but I have had twenty tons per acre of other kinds, for instance, the Michigan Dent corn, which will grow eight feet high with many large leaves. We have been told at our conventions about cutting the corn one, two and three inches in length, but you cannot get the cutter to cut it three inches long with any degree of satisfaction, for the machine will be running idle halt the time If you cut it five-eighths or three-fourths of an inch it will be more practical and profitable, as you can get a little more in. I believe that Prof. Robertson is the best posted man on this subject of dairying that can be found on the continent of America to-day. (Applause.) I used to be like other farmers, thinking that if I got 3,000 lbs. of milk from the cow that was all she could do for me, but since I have begun to feed the creature properly she has nearly doubled that quantity. But it will take starvation to drive the average man to do what he should in this matter. (Laughter.) We must look to an increased production of milk for our profits, for I do not think we will ever get twelve cents per pound for cheese again.

A Member.—What breed of cow do you prefer?

Mr. Carlaw.—Would you have me pick a wife for you? (Laughter and applause.) Get the cow of your own choice if she will fill the bill—or the pail. It does not matter where she came from. I do not care whether she is called a common Canadian cow, a Jersey, an Ayrshire or a Holstein. You can get the common cow to do just about as well as any if you feed her properly. Do not get a grade of a thing there is nothing in. Nothing from nothing and nothing remains.

Mr. Redmond.—Prof. Robertson has talked about the farmers and the cheesemakers, but he has not given us his opinion of the cheese-buyers. I hope he will speak to us about the buyers and the exporters. We have had some differences in the past with the cheese-trader, and it is to be hoped that the Professor will give his opinion on this subject.

The President.—Prof. Robertson will speak later on, and will doubtless touch upon the point suggested.

Mr. Evertt.—I think the corn Mr. Carlaw spoke of is the same that I alluded to to-day. He calls it the Michigan Dent while I have known it as the Minnesota Dent. I would advise Canadian farmers to try that variety. It will mature well in the Brockville section, if sown early. It is very prolific of leaves and has a fine stalk.

Mr. Cumming.—I suggest that Prof. Robertson speak a little further this afternoon. I imported a car load of Michigan Dent and sold it freely, and it has given great satisfaction. It had ears 14 inches long in some instanccs.

Mr. Carlaw.—That corn is grown in Minnesota and Nebraska, and if it stands the climate there it surely ought to do so here also.

Prof. Robertson.—I have no reason to be afraid of saying to the cheese-buyers or salesmen here anything that I believe should be said about their end of the business. This business of cheese-buying and exporting involves the handling of a large amount of money, yet it stands peerless among the trades and callings of the country as to honesty. I do not find as much litigation in this calling as in others of like proportions. A law suit is a rarity, and that in a business of over $10,000,000 a year speaks well for the men engaged in it. (Applause.) I put this down first, that the buyer is not altogether a benevolent gentleman, but a man who wants to make a living and a *little* profit. When a cheese-buyer comes to a salesman it need not be expected that he is going to make a present of a half cent a pound to the other. If a man buys cheese for 10 cents he should not expect to get 9½ cents worth of cheese with a few pounds per box thrown in. If he buys cheese for 10 cents he has no right to get the salesman to dock off weight so as to bring the price down to a fraction less. During the last year there has been a little too much of this, which is not altogether above board—in that one factory gets more than another factory and gives a pound or two a box of cheese extra that is never paid for. Something for something and never expecting anything for nothing is fair. The chairman in speaking this afternoon said he hoped I would say something on winter dairying. I believe that farmers all over the country should add to their cheese business by making fine butter. When I first advocated that a great many farmers said my remarks showed that I was hostile to the cheese trade. They argued that every gallon of milk that went to butter-making took so much away from the cheese factory. But this conception is no longer accepted. No business can expect to be maintained comfortably upon a loss in any branch of it. Why persist in having cows milked for just six months (the average cheese factory is going but five and a half months) when by having the cows milked for ten and a half months you can send as much milk to the cheese factory and have more profit all the year around, with an income for nearly every month? The man who will attempt this will have more cows, better fed, giving more milk for a longer period, and there will be an increase in the cow population of the country. It will mean a longer winter season of production and manufacture, which means more earning power. Better calves will also be raised, and the reproach will be taken away of "cheese-factory calves—mainly barrel, hair and legs." The winter calf will be stronger, and having more care will be fortified in youth. The stock will be increased by better cows grown from calves worth rearing. We have now a large trade in the exportation of cheese to other countries, and as the quality improves the consumption will increase. But those countries which buy cheese from us buy twice the value in butter from all countries that they do in cheese. We have here the best opportunities for making cheese in the summer time, but we cannot make the article to advantage in the winter time First of all we have cold weather. The milk is extra sweet and it is hard to get body in the goods. But we have the best climate for making fancy butter in the winter. We have cold weather for keeping cream sweet and for keeping butter unhurt by transportation. We ought, therefore, to follow out our natural adaptations, and manufacture butter in the winter season. Then we will find more profit in this dairy business; we will extend into more stock and raise steer calves. It has been said that a man cannot raise milking stock and also raise steers. But that is a mistake. No one man cares to milk more than twelve cows, but he can feed and milk easily ten cows and feed ten steers, and find profit in it. Winter butter-making will soon mean a footing in the English markets, and fresh-made butter there is worth 26 cents per lb. Danish butter was quoted in Liverpool last week for 133s. and American summer creamery at 45s. There was no fancy Canadian butter selling. A few years ago I sold Canadian butter with the bloom on it to take the place of Danish butter, and there was no limit as to price. We can get the same price for butter as the Danes do if we make it as good as they do, and there is twice as many dollars worth of butter imported into England as there is of cheese. It would give us more money, more profit, and more transportation business during winter. A doubt has been expressed as to whether we can establish this trade in England. It is hard to overcome prejudice and get rid of a bad name. Nearly one-fourth of our fancy cheese is still sold as English cheddar. It goes from here as Canadian cheese, but it is palmed off as English cheddar by the retailer over there. If this is the case after twenty-five years' experience with cheese what will it be with butter? It was asked at one of our conventions that the Government should undertake to make an appropriation of $5,000 for the purpose of introducing fresh-made butter into the British markets by small, regular shipments until the name of Canadian butter was established and the people would call for it. Nothing was done in the matter; but it is now under consideration how far the office of Dairy Commissioner can be be used in having experiments made in butter making as well as cheese making, and having that butter sent to England every week until we lead the farmers to see the benefits of producing good butter, and thus induce buyers to forward shipments of our finest fresh-made butter to the Old Country. We hope to be able to demonstrate that farmers can get a large profit in sending cream to the creameries during the winter, and also demonstrate that we can send to England as fine butter as she can get from any other country, while at the same time we hope to educate the English people to call for Canadian butter, furnished by men who have plenty of time in winter, and a good opportunity to handle the product to advantage. I trust this is something that will commend itself to all present. I am glad that we have here the Minister of Agriculture for the province—a gentleman who has at heart the interest of the farmers. We have also Mr. Thomas Ballantyne, who is the father of the cheese industry in this province, and we have the genial Gov. Hoard. Here is a triumvirate such as has never been presented to an audience of agriculturists before. (Applause.)

ENSILAGE FOR WINTER MILK.

Mr. Sydney Fisher, M. P. for Brome being called upon for an address, said: I had no idea in coming to Brockville on this occasion that I should be called upon to address you, and for two reasons. In the first place I understand that this is a meeting of cheesemakers, and as I am essentially a butter maker and really know nothing about the manufacture of cheese I do not believe I would be justified in asking your attention for any length of time. I may say, in the second place, that I came here to try and find out why the Brockville Cheese Board and the makers of this district have been able to distance us so much in the prices commanded by your cheese. We of the neighboring province have been looking for a long time with envy upon the success of the Ontario cheese makers. In years gone by our Eastern Townships butter led the other provinces and commanded the markets, but of late we find that Ontario butter has been pressing us, and we must bestir ourselves if we would keep ahead. Of late years, however, we have been turning our attention to cheese making, and are putting forth considerable effort to promote the industry. You need not fear our rivalry, however, for even if the other provinces make better cheese it will only put you upon your mettle to make a still better article. I have been very much interested in the remarks made upon the subject of ensilage. I have also been much interested in what has been said on winter dairying, for that has been my hobby for the last three or four years. I have had greater success than ever before by following out the plan outlined by Prof. Robertson. I have found that even during the summer I can produce fully as much milk from my cows, notwithstanding the fact that they are giving the extra milk in the winter. Or in other words, I do not believe the production of milk in winter is going to affect the yield of milk in the summer. This means that cows can be milked for ten months in the year as well as for six months. I got tired of having my cows doing nothing, and am now making a profit out of my winter milk while it does not interfere whatever with my summer supply. And this has been done by ensilage. I was convinced some years ago that this was the right system, but was frightened at the cost of the silo as then built. I have taken some credit to myself that I was the first man on the continent of America to make a wooden silo. (Applause.) There need be no fear at all of building a silo. It will enable you to feed your cows at a nominal cost, and you can raise your corn at very little more trouble than it gives you to raise grain. Prof, Robertson has given you a sketch of a silo. I have built several silos, and I can assure you that any farmer can build one only costing at the rate of 50 cents per ton capacity, that is to say a 100-ton silo can be built for $50. I am convinced that a 100-ton silo can be built in any neighborhood at an outside cost of $60 or $70 for the full cost of its construction. I do not think, therefore, that there is anything to frighten farmers from entering upon this new system. We can feed more cows on the same extent of land, and therefore enter the industrial and commercial race with brighter prospects. We can make more butter at a time of year when the price is the highest for that article. I am very glad to be here to learn what I can from your methods, and find out what is the secret of the wonderful success which has attended the efforts of the cheese men of this Brockville district.

The convention then adjourned until 8 p. m.

FIRST DAY—EVENING SESSION.

A large audience, including many ladies, assembled at the Opera House at the evening session. President Warrington occupied the chair. The platform was occupied by prominent members of the Association and leading citizens of Brockville.

A WELCOME TO HON. MR. DRYDEN.

Mr. D. **Derbyshire**, Mayor of Brockville, read the following address on behalf of the citizens of Brockville :

Address from the Citizens.

Hon. **John Dryden**, Minister of Agriculture,
Toronto, Ont.

My Dear Sir,—We are delighted to have you with us this evening, and extend to you a hearty welcome to our Island City and Eastern Ontario. We feel it a great honour to have you here to aid us in advancing one of the greatest industries of our country. You are now in Brockville, the county seat of the rich old agricultural counties of Leeds and Grenville, among the pioneers of the great dairy industry of this province, where the largest and by far the most important dairymen's board of trade in the Dominion is held, where some of the finest factories in the land are situated and a great many of the most energetic agriculturists of advanced thought live. I know, sir, that some of our Ontario Ministers think that if they visit the peninsular or western section they have seen the best of Ontario, but we are gratified that you have come to our eastern section, and I would say to you now, if you desire to be strong in the interests of agriculture, as I am sure you are, "Look well to the East." We feel proud of you that you belong to a Government that has ever had a fostering care over every interest pertaining to agriculture. I shall always remember Hon. A. M. Ross, then Commissioner of Agriculture, who so generously assisted this and kindred associations, farmers' institutes, our agricultural college and attended carefully to the wants of our agricultural community. But, we sir, expect greater things from you because this has been your life work. You have been specially trained for the very important position you have been called to fill ; you have always led in every branch of agriculture in your section ; you know our wants and failures in the past, and thus you will be able judiciously to apply the remedy. You represent the seven-tenths of our people upon whom the whole are dependent. And, sir, we congratulate you on your clean record in parliament and every other public position you have been called upon to fill, on your legislative ability and also on your careful, consistent life. We feel proud of you as our special representative and trust you may long be spared to adorn the position which your high attainments so admirably qualify you to fill. Again, sir, I bid you welcome and extend to you the freedom of this our Island City.

D. **Derbyshire**,
Mayor.

President Warrington then presented the honourable gentleman with the following :

Address from the Association.

Hon. John Dryden,—On behalf of the Dairymen's Association of Eastern Ontario, I have pleasure in welcoming you here to-night and of thanking you for your sacrifice of time and the annoyance and trouble of a railway journey to honour us with your presence this evening.

On behalf of the Association I also compliment you on being called upon to fill that most important position, viz.: Minister of Agriculture for the Province of Ontario. You prove, sir, by the inconvenience you have put yourself to to be present with us this evening that you have the interests of the dairy industry at heart and I trust that this visit to Brockville will show you the great work that is being done by this Association to maintain and increase that high character we hold to-day, as manufactures of the finest cheese, on the average, made anywhere in the world, and I trust that the endeavors of the Association will meet with your approval and approbation, and once more on behalf of the Association I bid you a hundred thousand welcomes.

J. T. **Warrington**,
President.

THE MINISTER OF AGRICULTURE'S REPLY.

Hon. Mr. Dryden, in coming forward, was received with hearty applause. He said:

Mr. Mayor, Mr. President, Ladies and Gentlemen,—While I listened to the mayor reading his address I began to think that possibly I was mistaken after all, and that it was intended for some other gentleman. I must confess that I did not quite recognise the description which in his address he was giving of myself. However, when I got a look at his kindly eye (he can look pretty sharp, too, when he likes), and found that it was really intended for me, I must say from the bottom of my heart I feel like thanking those whom he represented in his address. I am glad to be permitted to visit the town of Brockville. I am glad to be present and meet with the members of this Convention. I meet with a Dairymen's Convention for the first time in my life, and that means, as you all understand, that I am not a dairyman myself. If my other half, I should say my better half, were here, I could introduce to you the "dairyman" of our family, and she is a good one. When I go home the butter tastes all the sweeter and all the better because I think that possibly she had a hand in it. But while not present at your meetings, and while I have not been considered a dairyman myself, I have always taken a deep interest in what you have been doing as an Association. I have watched the efforts which have been put forth by our dairymen in this country. I have also observed how you have increased the dairy products in this country to the immense proportions which it has to-day. I have also observed how the quality of the product has been so much improved, until now my friend, the President, has been telling us that you manufacture the best cheese in the world. Now, I believe that I am not saying too much when I say that every loyal Canadian in this country is proud of the result of the efforts which have been put forth by this Association, and Mr. Fisher will pardon me for saying that this afternoon, while I listened to his address in the other building, that a feeling of pride spread over me as I heard him say that he had come up to this province to learn how it was that our cheese was so much better than that made in the lower province. He says he came up here to learn. I hope that you will endeavor to help him, because you will be only caring for your own interests in doing so. I hold that if they are not putting as good products on the market as you are, they are injuring your trade; they are injuring you because their product does not come up to the product which you yourselves export. A man thinks he has does a smart thing, possibly, when he has palmed off a thousand boxes of cheese which is inferior and gets nearly as good a price as you do for a superior quality. I say he has done a mean thing. He has injured himself in putting that inferior quality of product on the market. He has injured his country as well. He has injured the reputation of his country. If you ship cheese after such a man has preceded you, your would-be customer looks at your article and says: "There is a Canadian brand upon it; that came from Canada. I had some from Canada once and I don't want any more of it. It is an inferior quality, and I desire you to understand that lightning does not strike more than once in the same place." (Laughter and applause.) I wish that I could influence our farmers all over the country that in the product of their farms they would seek to produce a better quality of whatever article they are sending forward to market. It is just as true of every article as it is of cheese. The fact is, what we want to do as farmers is to increase the quality of every article which we produce. Of what advantage is it to me if I am able to produce six or seven hundred bushels of wheat of a very superior quality and put it on the market. I may get a little more than my neighbors. It is put into an elevator and mixed up with other inferior wheat, and the result is that my wheat is to be sold on the average quality of the general product, and therefore it comes to pass that I loose what I ought to gain in that better product. A gentleman told me when he was buying some sheep from me once, "I could give you a good deal more if I were buying a thousand of the same quality, but have to sell your sheep according to the average of the lot." Now, if you can put good beef upon the market you are creating a demand for your product which you would not be able to do otherwise. One of the farm delegates while he was up in the North-west was relating to me a good deal of his experience. He was like other Englishmen, very fond of beef, and there being steak on the bill of fare, he thought he would try a bit of this beefsteak which was not broiled but fried—and it was fried pretty hard. He got it upon his plate and he used to the very best advantage possible the knife and fork which they had given him, but he could not make any impression on it. He turned it over and tried on the other side, but without any effect. So he called the waiter and asked him "Do your people of this country grade the beef just as they grade the wheat?" "I don't know what you mean," said the waiter. "Well, I mean what I say; do you grade the beef as you do the wheat? If you do I would grade this beef as No. 1 hard. (Laughter.) Now a good deal of No. 1 hard has been put upon the market, and so it goes in reference to all the other articles. I am very fond of a little roast lamb; I like it perhaps better than anything else, and sometimes I screw up my courage sufficient when I am at the dinner table in a hotel, to ask for a piece of this roast lamb. But it turns out to be what I call a ten year old lamb. It is like the chickens. All hens are called chickens, but old hens are generally called spring chickens, the older they get the younger they become. I don't like this sort of thing. I don't know whether it is the butcher or whether it is the landlord that has defrauded me. The fact of it is, I quit calling for mutton. It means that just so much less is consumed. That touches me and you as the producers. Sell to one of your prominent townsmen some of your inferior butter, and I ask you how long will it last. It will last a long time, but if you replace it now with a choice sweet article, then what is the result? Every one wants to eat it, and the result is that the head of the house has to warn the members of his home not to take so much of this butter. Now, it is hard on the consumer, but it is good for the producer. So I say, that if you want to you can create a demand for your own article by putting upon the market a really good quality of that article.

When I was coming here to-day I happened to bring with me one of the reports relating to agriculture in Great Britain, and I observed from this report, that the consumption per head, in Great Britain, of cheese and butter imported is on the increase. Twenty-five years ago the amount per head, which was consumed of butter products, was about four pounds, now it has increased, until in 1889 it was more than double, being 9.04 per head. The cheese consumption has also increased from 2.09 to 5.06 pounds per head, but the truth of it is that within the last five years there has been no increase in the cheese, while there has been a considerable increase in the butter. The inference, I say, is this, that outside Great Britain there are some countries producing butter good enough to create a demand in Great Britain for that butter, whereas the cheese is not being improved in the same proportion. Now, where does this butter come from? I don't think very much of it comes from Canada. I think if you will study it out that you will find that much of it comes from the state of Denmark. Until now I am told that in England parties are inquiring for and demand the Danish butter, no matter what the price is. It is perfectly true that in England and in London, there are those who demand a better quality and they must have it, and I think what we ought to do is to seek, by some possible means, to produce this better quality and so fill this demand. Now how shall this be done? I say it must be done by continuing the process of instruction and education which have been given by this Association in the years of the past, I hope you will not cease. It will take the coming years to educate all the farmers. We cannot see the result of it just yet, but we will see more and more of it as the years go on. Now, I am not one of those who think that governments can use legislation so as to make the people rich. That is not true. But governments can do a great deal in helping the people, and one of the means which they can use is to endeavor to educate them. I am happy to say, however, that the Government of which I have the honor to be a member, will always assist you in this direction. I have, myself, been considering what means we may be able to use in order to do this better than we have ever done in the past. (Applause). We must not stop, we must go forward. We have to enter into competition with all other countries. We must educate the people. I am seeking to do this from my Department, and in order to do this, I have coupled myself with the farmers' institutes of this country, and if there are any of you here who are not interested in institute work, I beg that you will interest yourself now. I am asking the secretaries of these institutes to send in their names and addresses of all their members, and then I propose that the members of these institutes will have the benefits of all the bulletins and other papers I can lay my hands on. It means some work, but I have just this to say, Mr. President, I believe the Government owes the farmer something in this regard. The Mayor, I think, in his address referred to the fact that I represented in my Department seven-tenths of the people. And I submit that this seven-tenths of the people are at the very foundation of the prosperity of this country. Some of the farmers are beginning to get discouraged. They say it is terribly hard times, everything is looking very blue, and wish they could get into some other business. They cannot carry on any other business successfully in this country if you and I don't prosper, and therefore I say that the Goverment of this country owes something to that seven-tenths of the population which I represent.

You have been good enough, Mr. Mayor, to refer in your address to the fact that some of the Cabinet Ministers think that when they have visited the west they have seen the best of this country. I desire to say in reply that with your humble servant, sir, there is no east or west to this country. I mean to say that my sympathies go out to all the farmers and to all the dairymen, I don't care whether they live in the east or in the west and I am prepared to say that I am bound to treat you all just exactly in the same way. It is just the same when we get down to Quebec. I like the idea of understanding that I am a Canadian. I was born in this country, and I expect to die here. I was born a farmer's son, and I am therefore always proud to represent them and to lay claim to the position of a farmer no matter where I am. Now I say I believe in agriculture for this country. We have not a poor country as some of you seem to think. If you will go to Great Britain you will find that there they have depression. I have seen men there who have lost thousands of pounds in this pursuit, but right alongside of them I have seen men gaining instead of losing. How does that come to pass? They have been willing to adopt some new plan which they have seen will be greatly to their advantage. When a man has got to that pitch that he thinks he knows everything about it I think he has begun to go down. The farmers who hang around the bar-rooms belong to the class of people who have learned all there is to know about their business. They say, "What is the use of me going to their meetings, I am living on the farm my father used to work and I am following in his tracks." Now when you get a man like that you have got a man who sooner or later must go down. He cannot keep up with those anxious to learn. Now, Mr. President, you will observe that my voice is getting husky, and I will only say that I am extremely obliged to you for your kind words. I have made many acquaintances in your town; I have met men whom I wanted to see and I hope to be better acquainted. If you have any suggestions to make I hope you will not be slow to give them. I look to you as helpers in this work. I know that so far as this Association is concerned I shall have your hearty co-operation. Give me this and your sympathy and I will always try and keep this country to the front, as it has been in the past. (Applause.)

MIND AND MUSCLE ON THE FARM.

Prof. Robertson began his address by some complimentary references to Brockville and its enterprising cheese buyers, and expressed his regret at the absence of Prof. Saunders, of the Central Experimental Farm, who was to have addressed the meeting, but who was detained by the death of a friend, after which he proceeded to make the following remarks: The farmers of Canada need to do more thinking instead of more laboring with their hands. The experimental stations of this country are intended to aid in the enlargment of thought, and to stimulate activity in head work among farmers. Somebody's clear thinking must precede and underlie every rational action that makes for the mitigation of toil and the increase of profit. Farmers spend too little time in practical thought. Men in other callings sit down to think out the questions pertaining to their business, but the farmer is often too tired to think on purpose to plan. Every farmer should think out the problems he has to face,and having solved them mentally he should proceed to carry his plans into practice. Too many farmers are content to get their living in a dreary, humdrum way, without a single aspiration more than to have a bare living and two ounces of tobacco a week. (Laughter.) If each would try to be the leading farmer of his locality, profits would come more certainly and easier than if there be only the desire to be merely a sort of higher animal that eats and sleeps comfortably. I was pleased to hear the Minister of Agriculture say that governments cannot legislate good times for the farmers ; and governments cannot legislate bad times for the agriculturists. If a man depends upon himself he can make good times come, but if he looks off to the far hills and lets his muscles and brains become numb, he will never amount to anything. Personal ambition is a good thing in a farmer, and so is persistence. Now, farmers often cannot make ends meet, because they lack the element we call persistence. Let me give an illustration. In one part of the Dominion recently visited, I found that the roofs of houses still wore brackets used twenty years ago when the shingles were put on. There were barns grown old where the doors had not been hung. Most things were left half finished, and the people wondered why the good Lord did not smile upon them. They were complaining of hard times and moving away, yet that section is in my opinion blessed with good land and a fine climate. But the people lacked persistence, reliance, aspiration and clear thinking. A farmer's occupation demands peculiar powers and special training. Men who live in cities or towns have only one trade or business or profession, but the man who lives on the farm has to follow a three-fold occupation. He must be a good tradesman and understand the use of tools ; he must be a good business man to know when to buy and sell, and he must be a professional man to plan how and when and what to sow in order to get a profit from his work. He must be fitted for his calling if success is to follow. Farming with everybody but Scotch people is to make money ; the sole object with Scotch people is to set a good example. (Laughter.) I will not speak to you about the advantage of knowing how to handle tools, etc., any more than to suggest its importance. You all know that in a neighborhood where plowing matches are held annually the crops grow the better. And the boy who excels in plowing usually becomes fond of other farm work. Where land is plowed uniformly the crop has a better chance in the seed bed, and so it pays to encourage good plowing. It is not necessary to dwell upon the business aspect of a farmer's life. It is too generally the case that the farmer does all the business of the family, even after his boys are grown up. The young men have no experience in marketing until they are thrust out at say twenty-five years of age to do for themselves with the experience of a lad of ten. Let the boy take a load of grain to market, and even if he loses a little at first it will not be a great amount, and he will be gaining a valuable experience which will be a most useful part of his education. The farmer should thoroughly understand his business. The man who knows why he drives a spade into the ground will do better work because of that knowledge. If he does not know why he should drain his land he will have failure. Speak to some farmers about their place in society, and they will hardly ever assert themselves as having influence or dominion. But if a man can govern plant and animal life for good he will likely be able also to influence his fellows in the higher activities of life. Many a man is lost because he would not think for himself, but delegated that to others. When a man begins to think, and says "I want to know," he is asserting his manhood, and that one thing distinguishes the man from the hind. A man in those counties where agriculture is behind is called a hind, a grade between a man and a lower animal. But as the tiller of the soil thinks, he assumes, or rather resumes, the birthright of prosperous manhood. In this country we have a capital illustration of this. First we had the deep and almost impenetrable forest, and the farmer was a devastator. Those magnificient monarchs of the woods fell before the strokes of his axe and the bush became a ruin. While the work was destructive there was not much thought or skill required. But when man began to put new plants in the place of those cut down, he began to need the helpful guidance of clear thinking. Then came the construction of roads, the erection of bridges and the building of houses and general development. For that kind of constructive work, that work which emulates creation, a man must have some thought and bring his own hands to his own work. The farmers were at first getting big crops off virgin fields, but after a time the fields became poor and the crops would not yield enough, and men needed new instruction in order to make the earth give forth a fresh increase. Farmers need to rescue their calling from a condition of decay. No sudden calamity or disease is going to strike us ; but agriculture has been suffering from slow decay. Farmers must recover themselves, and that improvement must come through the mind. Many farmers have had a prejudice against education, but I am happy to know that it is no longer needed to plead with them as to the value of an education, for they now say that their boys must not start where they began. The old misconception was that education would hinder a man, but now these old prejudices are being uprooted and it is seen that education helps to fit a man to bring things to pass, whether it be in the office or on the farm. A man should live on a farm to make things give out an an increase just because he is there. A few farmers still belittle education because it makes a man stuck up. They say " Oh he is a fiddling scientist, but there is nothing in him." When you find a man who loads up knowledge to put it upon his back and carry it around with him for display, you will find him a very tiresome person. (Laughter.) But if you find a man who gets knowledge only to use it and keep it under his feet he is deserving of and will receive respect. I want to say to the young man here that knowledge is power to a man just as fuel is power to an engine. You may have a big engine, magnificently prepared by the skill of the ablest mechanics, but if there is no fuel in the furnace box there will be no power. The boy who goes through life and gets no instruction about his own calling is just as magnificently constructed, but he has no power because he has not possessed himself of the energy of knowledge. Get knowledge, not to carry it about, but to make men better, more useful and more comfortable because of your having it.

Now just a few words about the present needs and how they can be met. The Government of Ontario has authorised the introduction into the public schools of a text book on agriculture. That I consider one of the greatest strides in the right direction ever made by the Government. It is a book costing only 40 cents, but it is a compendium of agricultural information, the equal of which has not before been printed. The boys of this province will be all the better for reading this book; they will farm better because of its help. I hope every Board of School Trustees will insist upon having it put into their school, for the good of the little boys, the bigger boys and the old boys. I do not know a better way of spending 40 cents than by buying that book, and I have no royalty on it. (Laughter.) Then there is the agricultural press, but with our 200,000 farmers there is a circulation of only 20,000, or about one in every ten homes—a bad state of things. Man's mind needs food, but that brain food should no more be borrowed than his breakfast should be. Such a breakfast would not taste very good. Do not borrow your agricultural paper ; pay for it. We have also our Farmers' Institutes, the existence of which has done more than anything else in the past ten years to stimulate better farming. Then we have our Dairy and Creamery Conventions, and last of all our Experimental Stations, to send the kindly light of information into the poor homes, as well as into the homes of the wealthy and enterprising. At Guelph the Ontario Government has had an experiment station for sixteen years, and it has rendered good service to the province. The Dominion Experiment Stations are to day doing equally good work for all the provinces. In connection with this system there are a number of pupils who do not live at its centres, whom we may call non-resident pupils. They are expected to do all they can to assist in the work of the Department. They are the farmers of Canada, and it is inspiration to a man to think that 3,000,000 non resident pupils are looking to him to play the part of one giving them helpful knowledge. The farmers are said to be seven-tenths of the people, and if you can get them to have confidence in and co-operate with each other in their study and work, you will have them bound together in a nationality which will make them strong and great. Individually, alone, each farmer cannot do much. I have watched a boy blowing soap bubbles and floating them into the air—such little things—glistening, sparkling. There was so little water that when one burst I could not see it. I began to wonder what a soap bubble would look like if it were as large as a waggon wheel. Perhaps I could then see some of those wonderful molecules. But Tyndall says that if a bubble were magnified to the size of the earth those molecules might be seen about the size of No. 6 shot. Taken singly and alone, these infinitesimally wee units of matter cannot do much. Let us see an evidence of their power in united action. A quart of water—all made up of these inconceivably little molecules—is put into a strong iron vessel, which it quite fills. The sides of the receptacle are as thick and strong as the acquired experience of centuries of metal working can make them. The small opening is securely closed. The water is made to freeze. These little molecules seem to turn a little, and, when shoulder, to shoulder they all push together for more room for themselves, the strong vessel is burst like an egg shell. Let farmers co-operate for ends that are just and objects that are for the common good, and nothing can hinder their success. Education in concerted action is their great need ; not for coercive application, but for mutual help in bettering their avocation, their circumstances and themselves.

The speaker then went on to describe the work of the experiment stations conducted by the Dominion Government, painting in beautiful language some of the charming scenery in the provinces east and west, and concluded in the following words : We have in this country every natural resource that the heart of man can desire, and to realise upon their power of service for our national development we have only to put our skill into practice. I trust that all the educational helps to agriculture mentioned this evening may have plentiful fruitage, and such gatherings as this will not be in vain. May we all with one united effort try to make this Canada of ours prosperous, that our land may be filled with happy homes, kindly hearts and a strong manhood.

MENTAL CULTURE AND AGRICULTURE.

Mr. **Sydney Fisher**, M.P. for Brome, after a complimentary allusion to the eloquence of the previous speaker, said : Our friend, the Hon. Minister of Agriculture, has told you that I came up here from Quebec for instruction. I have indeed come here for agricultural education, and so far as I have seen of it this Dairymen's Convention is a very good school to come to. It has been my good fortune to listen on several occasions to some of the gentlemen who have spoken to you, but never to greater profit than during the present Convention. I have said to the educationists of my province some things which I would not undertake to say to the educationists of the province of Ontario, and above all in the absence of my friend Hon. G. W. Ross, your Minister of Education, who has so much at heart your educational system and who is so justly proud of it. I fear that the educational system of our country has tended to lead our youth away from the farm, and I believe this is a reproach which should cease in the future. It has been a national misfortune that so strong a tendency toward city life on the part of our rural youth has prevailed of late. The whole trend of our schools has been to turn our boys away from agriculture rather than towards it. I speak more especially of those young men who are a little more ambitious than their fellows. They have had some success at primary schools, then at the academies and finally at the universities ; and the tendency of all they have learned at these institutions is to crowd them into the professions. There is too much competition already in the commercial and professional world, but the great lands of our country are crying out for men to fill them. Our Governments are trying to bring men from the crowded centres of Europe to come and work our soil. We do not want immigrants to our cities, but farmers with capital. Still the whole educational system of our country has been tending to drive our young men from the country to the cities. But I am glad to say that a successful attempt has been made to change this condition of affairs, and all honor should be given to your educational system here for that improvement. You are the first in the Dominion of Canada to put into the hands of the youth of the country such a work as Prof. Robertson has described this evening. I, too can say, as the previous speaker has said, that the putting of that work into the common schools of the province is one of the best things that has been done in the Dominion of Canada for years. It used to be thought that only the stupid boys should remain on the farm, and that the bright lads should go to the cities. Our clever young men have left the farms and gone into the cities because they wanted to attain high positions and be among the first in the land. Heretofore we have been disposed to look with envy upon the men whose hands were driving quills, and who were able from one year's end to the other to drive around the city wearing tall hats. But these are not the men who have developed the country. It is the men who have been 70 per cent. of the people; the men who consume the greater part of the imports of this country—the men who till the soil. And I am glad to know that while in the past the other callings have had the main credit the people of the country are now beginning to honor the farmers. There is Gov. Hoard, essentially a farmer, a man who has arrived at his present high position by force of his ability. We have with us to night also Mr. Thomas Ballantyne, a gentleman who has occupied for a long time an honored place among the people of Ontario. And the farmers should be proud of the fact that they have so fitting a representative in the Cabinet as the Hon. Mr. Dryden. When I came to man's estate seventeen years ago I bought a farm, and have been learning all that I could about agriculture, but I have much to learn yet, and have come here to gain knowledge. There is no calling, not even medicine or the law, where there is more scope for the exercise of a liberal education than in agriculture. Farming is yet to hold a higher position. There are new conditions and circumstances arising, which demand changes in the business. There was a time when we had a virgin soil, but we have abused the land and it has become exhausted. In consequence of that exhaustion we must apply the best intelligence for the recuperation of the soil so as to be able to compete with other lands. Our forefathers were able to scratch the land and produce abundance, but we have to try many means in order to get an increase. We have the competition of the whole world, owing to new modes of transportation. India, Australia, and Asia are seeking wider fields for disposing of their produce. We may not be able to control prices, but we can apply ourselves to the best methods of production, to lessening the cost of that production and so meet competition with better prospects of success. Such meetings as we are now having are the best means of education along the lines I have referred to. I am able to come here and get the benefit of the labor and knowledge and experiments of the more intelligent men who practice agriculture. You can also go to the gatherings in the west, and you have here some representatives from that quarter. The effect of such meetings as these, with their eminently practical discussions, is to improve the general make of our cheese product, so that when once the article is known to come from Canada it will not be necessary for it to pass any further examination but it will be taken simply upon the fact that it has come from this country. Canada to-day occupies the very highest position as a manufacturer of cheese. Our professional men have not been able to put Canada in the van, but our cheesemakers have placed us in the very forefront. I trust that when I go home I will be able to give such a report of this meeting as will encourage my neighbours to imitate the good work you have done here. What I have learned to day has amply repaid me for my trip here.

After the passing of votes of thanks to all who had assisted in the evening's proceedings the convention adjourned until the following morning.

SECOND DAY—MORNING SESSION.

After bringing the meeting to order the President said: I have great pleasure in calling upon Gov. Hoard to address us this morning. He was to have spoken yesterday, but felt indisposed owing to not being in good health and having taken a long journey.

WINTER CARE OF COWS AND BREEDING.

Gov. **Hoard**, who was apparently in far from robust health, was most cordially received, and spoke as follows: I am a good deal this morning like Jimmy McGinnis's musket. He was a fellow soldier of mine, and one day he started off to do a little bit of skirmishing with an old-fashioned cartridge. Some of the boys had played a trick upon Jimmy by doctoring his cartridges—the contents being half salt and half powder, and Jimmy declared that whenever the gun went off "it had a quare way of expressin' itself. Troth, and it sounded to me as if it was troubled with bronchatis." (Laughter.) That is how I feel to-day, having been taken with a severe attack of la grippe last December, and it has settled in my throat. You will excuse me, therefore, if I do not do justice to my subject. I will take for my topic this morning the winter care of cows. I find, particularly in the old dairy districts of New York and Canada, a great degree of indifference on the part of the average farmer concerning the winter care of his dairy stock. There seems to be an idea prevalent amongst cow owners that almost any kind of usage will do. For instance, I was attending a dairy convention in New York State on the 15th of December. In riding through one of the counties I passed hundreds of dairy farms and saw cows wandering in the fields while the thermometer was down to zero. I saw them turned out at nine o'clock in the morning, and kept out until four o'clock in the afternoon. And that appeared to be the general custom with those farmers. In asking some of them afterwards why they handled their cattle in this way, they told me it was because they wanted to give them exercise, and that the cows needed exercise. I asked them if they had ever summed up the cost of trying to warm a forty acre field in the winter time with good food, and they said they never had. I asked them if they had really determined whether they had learned the temperature of that field, and they said they never had. I asked them if they had investigated the temperature of the cows, and they said they never had. Here were old farmers, who for years had been grumbling about the hard times, and swearing that the west had cleaned them out, and I said to them: "You can go into Jefferson county, Wisconsin, twenty years old, and I dare you to find such an example as you are setting, turning a cow out on a cold winter's day and leaving her to wander over the dreary fields." Some men never realise that it takes more food to keep their cows if they are to be exposed to the cold. There is not a dairyman here present but knows that a cow well wintered is considerably increased in her productive powers in the summer. The dairymen of this section are largely engaged in the production of summer milk, but not one in a hundred is handling winter milk. Your cow is a boarder in the winter. Now, condition is a very important matter in the case of a cow. The dairy cow is a working machine, and if you are to have a well-ordered machine for next summer's work you must winter her honestly. We are making merchandise of that cow's maternity, but do we treat her from the standpoint of a mother? No, we treat her as a bullock. We are dealing with the maternal functions, and yet we are perfectly indifferent to the laws which govern a female. My wife, who is the mother of three boys, has been to me a potent agent in the study of this question. And I would say if you want to know how to treat a cow you must first study how to treat a woman. First study the human mother, and when you have got at the laws which govern her in the exercise of her maternity you have also arrived at the laws which govern the bovine mother. My wife gave me my first lesson regarding these laws of motherhood. One day we were driving a long distance, and she had an infant in her arms, when she complained of feeling cold, and said that it was too bad, as the baby would have to suffer from her chill. I asked her how that could be, and she said "Why it means less milk for baby." I then enquired if chilling had the effect of lessening the secretion of milk, and she said I was a very stupid man if I did not know that much. (Laughter.) And instantly my mind reached out to thousands of dairy farmers who never had dreamed of it any more than I had. That woman taught me there a very important lesson. She taught me that cold invariably caused a shrinking or weakening of the lacteal functions of the mother. That led me twenty-three years ago to my first investigation concerning the use of warm water. I said then to my wife, "What will you do to regain your wonted powers as a mother?" She replied, "When I get home I will take some warm drink. I shall endeavor by the use of heat and a little gentle stimulant to recover my lost power and have milk for my child." That showed me a principle upon which every keeper of the bovine mother could proceed, and led me to the use of warm water. I think I was the first to recommend the use of warm water for dairy stock in the winter. I plumed myself upon the idea that I had discovered something big, but every old woman in the land knew it long before I did. And yet we stupid men go along with an idea of handling this bovine mother against our interests, while our own wives teach us something better every day in the week. This question of handling dairy cattle is a very close one and demands particular attention. Now, suppose you divide your duty as a dairyman. First you ought to be a good breeder. The day has come when every dairyman must go down who does not address himself to this question of keeping a better cow. Competition is crowding men to the wall. I have just been reading Gen. Booth's "In Darkest England," and it is an awful picture of human competition—of competition in flesh and blood. Human competition is crowding us also. You will have to make butter and cheese at lower prices than in the past. You must not flatter yourselves that you will get old fashioned prices, for they will never return again. If the farmer would get that cursed idea out of his head that he is a producer, and realise that he is a manufacturer; that there is no such thing as raw material with him; that the pound of wool is his manufactured product; that the load of cordwood is his manufactured product; that the pound of beef, or milk, or cheese, or butter is his manufactured product;—if he would then apply himself to the finer problems and economies which bring money, as studied by other manufacturers, he would soon rise to the dignity of his noble profession, and more practical results would attend his labors. Why do the farmers not more closely study the economy of a good cow? The actual record of Canada indicts the intelligence of its dairymen. It is a square indictment. And it is so in Wisconsin and in New York state. Here are men doing business with cows which barely pay for their feed. Your average production of milk in this province is only about 3,000 lb a year, and I heard Mr. Ballantyne say that he has a heifer that gave him last year, with her first calf, over 5,000 lb. Dairying cannot be prosperous unless you start with the idea that the farmer must become a breeder, and have a proper ideal of a good cow. You will have to stop this senseless and wicked principle of putting a premium on dishonesty. I tell you that when you have taken in milk by the pound, and have allowed a man, who would cheat, or had a cheating cow, to get as much for his milk as the man who dealt with you honestly you put a premium on that unfair dealing. Human nature in Canada, as is the case of Wisconsin, is dangerously weak. (Laughter.) I had a test in our factory recently. I did not let any man know who his neighbour was. I went to No. 8 and said "There is No. 11, whose milk is worth five lb. to the hundred, and yours is worth only three. Do you think you should have as much dividend out of this factory as that man who gives two lb. a hundred more?" He said, "I don't think the test is right." "Well," I replied, "here is the test of every patron in the factory; the test is by the churn, and the churn is two pounds ahead." And some of you have been paying a premium to a man who was breeding a cow that was no better than a pump. (Laughter.) You are putting a premium upon the dishonesty of your people.

A VOICE.—Yes.

GOV. HOARD.—Well, there is one Lot in Sodom. (Laughter.) It goes hard with Sodom. (Renewed laughter.) This premium business is well illustrated by the remark of an old German who lived near where I once resided, and he was a genuine old Dutch philosopher. One day I saw him leading a two-year-old heifer back from the fair. I asked him if he got a premium. He looked black and said: "You know what I tinks? Vell, I tinks dhis: If a man has the bestest heifer and go to der gounty fair, if he don't got a goot head he don't got a bremium." (Laughter.) He found out that a good head counted for something. People are seeing that quantity, not quality, is established as the rule, and they are making their fortunes at the expense of the man who gives quality in his milk. This principle has demoralised the business and impaired the moral sense of the people. The first thing to do is to teach the farmer that he needs to become a breeder of a dairy cow; that he can produce a cow to his own liking, and that his cow must be a cow that gives milk blest of God and not of the pump. (Laughter and applause.) Why cannot we forecast this question? Why cannot we exercise the brains of intelligent men, and, foreseeing the evil, escape it? We must produce milk more cheaply, and how can we do it? If we have formed erroneous opinions of the economics of a cow we shall be punished by these opinions. If we have deluded ourselves with the notion that there is no waste in having a cow that weighs 1,500 doing the same business as a cow that weighs 900 or 1,000 lb. there is no help for us. You cannot keep a 1,500 cow on the same food as a cow that weighs only 900. It may be said that one man who weighs only 100 lb. eats more than another who weighs 200, but that is no answer. We must divide this question of the food of support from the food of production. The food of support is that which goes to support the carcass, and it certainly costs less to feed a cow weighing 900 than one that weighs 1,500, for what the larger animal must eat to support its greater weight the smaller cow can turn into milk. This one fact is an important point. I have been an auctioneer, and have sold herds of cows, and have seen farmers pay more for a beefy animal but not much cow than for one all cow from horns to heels—yes, sometimes twice as much. Now, how are we to reach such farmers? Over in Wisconsin we are trying to make each factory a centre of dairy knowledge. We are going to make them schools, from which information will be issued to a degree never before practiced by us. And if we do not do something of that kind the farmer must succumb. You may put your hands into your virtuous cheap factory pockets, but as sure as there is a God in Heaven your breath will be taken away. Competition is crowding us from every quarter and cheaper food means inevitable progress and influence. If we are to make any profit on our butter next year, it must be by decreasing the cost of its production. Let me suppose that I have two cows in my barnyard, each one giving 3,000 lb. of milk. I cannot support the carcass of these cows for less than $22 a year. Here is $44 for the support of these two cows, and they give me 6,000 lb. of milk. But I have another cow that gives me 6,000 lb. of milk. I support her carcass for $22, or half as much for her 6,000 lb. of milk as it costs to sustain the other two cows, yielding between them the same quantity of milk. Why has not a conviction gone abroad to reduce the number of cows and increase the production? One man asked me the other day, "Where in Heaven will we land when all the cows produce 300 lb. of butter? There will be so much butter that no man will be able to stand up. The country will be fairly slippery with it. What will you do!" I said, "My man, when you have a 300 lb. butter cow, she does the same business as two 150 lb. cows, and you are doing the same amount of business at half the cost." We must push this question and let farmers see the benefit of breeding a dairy cow, and getting the same quantity of milk from one-half the number of machines. The two cows that give me 6,000 lb. of milk cost for support, $44. What did milk average for cheese-making last year.

A Voice.—About 70 cents.

Gov. Hoard.—Well, that is only $21 per cow. Now, I cannot even support a cow for a year short of $22, and yet the value of your average production is only $21. Now supposing again I had a cow that gave me 6,000 lb. of milk. The average cost would then be how much? The same for supporting the carcass. She might take an increased amount of food but she would return it to me in milk and not in mere existence. There is a heap of difference, as the Arkansas man said, in forty acres of sky and the same amount of solid land. (Laughter.) We have a lot of men on the other side who are clamoring against the tariff, and the railways and the trusts and keeping 3,000 lb. cows. And they are taking it out in clamoring.

One more point. We must learn how to breed a good cow. What constitutes a first-class cow? We must get the idea out of our heads that there is a cheese cow and a butter cow and a dairy cow. Well, there is a very profitable cheese cow, and if you can only rob your neighbours you will get rich on it. You may have a good cheese cow if every other patron has a good butter cow. (Laughter and applause.) Then comes the question of handling. In nine out of ten of our stables the manure freezes in winter. I have taken the actual census of it. I regret that, owing to the tariff, I was unable to bring with me a model of a good stable. When I was elected Governor of Wisconsin I was full of reform, and the first reform I executed was to put that stable into the executive barn. I put in a couple of cows, and when any one came in and talked dairying to me I sent them out to look at that stable. We must have comfortable, clean stables. Each cow in that stable is allotted 3½ feet of space, and she can lie in it without any part of her body being in the manure. I have one Guernsey cow splashed with white and she is just as clean looking in that stable as in a June pasture. That one word "comfort" must be well considered and looked after with a cow or she will take her revenge out of you. I was very much amused the other day at the way some men refuse to get knowledge. In Madison county, New York, where I was raised, there is one silo, and the farmers go and look at it critically, a sort of sideway glance; and that one silo still remains, a lone exhibition of one man's good sense, while the others are expensively speculating as to whether or not they will try it too. In the town [or township] where I live there are 45 silos, and in the town adjacent 65, and the other day one of the farmers wrote to the superintendent of the farmers' institute, "You do not need to talk silos. Talk about something beyond. That is conquered ground. Every man who has not a silo is thinking about building one, and those who have one are thinking of enlarging." Farmers need to be conservative, mind you, but there are some things which have been proved. The silo is an established fact. The man who has not come to the conclusion that there is a better cow than the 3,000 lb. animal, and that he can produce her, is a back number. The man who has not come to the conclusion that there is a cheaper and more comfortable and profitable way of caring for his cows is a back number. If he has not learned that there is a cheaper way of feeding his cows he is in the shade. Can we afford to be back numbers and remain in the shade? Knowledge is worth something; there are dollars and cents in it. I feel that some men are getting into the condition described by an Irish friend of mine. He came to me a year or two ago during a great drouth and I said to him, "Michael, it is very dry." "Yes, sur," said he, "It is as dhry as a limeburner's wig." Said I, "I see the wells are giving out." "Yes, it's dhry." "Well," I went on to remark, "what are you going to do?" "Shure, an' if it doesn't rain soon I'll have to soak my pigs to make them hould the shwill." (Laughter.) That dry-cracked pig is typical of many of us. We need to be more soaked with knowledge and intelligence if we are ever going to hold dollars and cents.

PREPARING CHEESE FOR MARKET.

Mr. A. A. **Ayer**, of Montreal, after a kindly personal allusion to the President, congratulated the Association upon the splendid gathering before him, and also upon the fact that the Minister of Agriculture, in addition to other able speakers, was present. He trusted that the outgrowth of the visit of the honorable gentleman would be the development of some schemes to aid the dairymen of the province to still further advance their great industry. You have heard it said that the western peninsula is the garden of Canada. The people of Brockville could scarcely make that claim for their locality. Nature has not done as much for its soil as she has done for western Ontario. But she has done much for the men of this section. They have been hardy and energetic, and their enterprise and industry have worked a wonderful improvement in their surroundings during the past twenty years. As I listened to the excellent counsel you have been receiving regarding the improvement of the dairy farm, the best crops to grow for feeding, the new and progressive methods of handling stock in winter, and above all the importance of manure. I was reminded of the story told of Mr. Samuel Briggs, of Manchester, who had brought his land to a very high state of efficiency. It is said that in a raffle for a donkey he found himself half-owner of the animal, and as the other man would not sell out his interest, the gentleman first named proposed that his partner might take the front half for his share, while he himself took the tail end – the part that gave the manure. (Laughter and applause.) The manure end is too often slighted, but it means the vitality of the land. When the figures of dairy product were read to-day I was led to think of thirty years ago when a product of 175 lb. of butter per cow was considered something wonderful. I remember that my father found a cow that was a good mother, giving 60 lb. of milk a day, and he said, "That's the cow to breed from." That cow had twins several times, and as fortune would have it they were always heifer calves, and soon we had a number of dairy cows all tracing back to the one mother, and all good milkers. Water was constantly before our cows, and that water was luke warm. My father did not have a silo, but he raised a good many acres of corn, and the native corn grew ten feet high on that farm. The corn was mixed with straw and cut up and fed to the cows. I am certain of this one thing, that a cow will not give much milk if you do not feed her well and keep her warm. There are a great many cows supposed to be poor milkers that would be good dairy animals if they were properly housed and fed.

I would like to say a little upon some of the aspects of the cheese business with which I am more directly acquainted. Some men do not like to hear of their faults, but that is not the way with you or you would not have made the advancement you have in the past few years. The next great step forward should be the improvement in the flavor of your cheese. I know you have improved in this respect, but not in the same proportion as you otherwise have in your make. I believe there are more cheese defective in flavor than in any other one thing.

Use the Aerator. It will be nothing short of a sin if every farmer does not put one in. There is no way in which you can make more advancement than in getting factories to use pure milk well aerated. You would not expect to get a cow that gives 6,000 ℔. of milk for the same money that would buy one that gives only 3,000 ℔. Then why should you hesitate to pay two or three dollars for an aerator, and so have milk that will make perfect, well flavored chesse? There is the tendency for a larger cheese. The bulk of the best commercial cheese should weigh 70 to 84 ℔, although some weigh 100 to 120 ℔. And why? Because the market always wants something that is difficult to make. But the average farmer says: "How do they expect us to keep up to all these things? It will ruin me if I attempt to do all that is expected of me." And then he goes home and does not even try what he can do. And that reminds me of a little story. A colored man down South was driving a mule one day when it fell to the ground and refused to get up. A doctor came along and asked what was the matter. The darkey replied: "Dis mule done lay down, and he won't go. I've licked him and coaxed him, but he won't go no how." The doctor took out a syringe and gave the mule a strong hypodermic injection, when it got up and started off at a lively gait before his owner could get aboard. The negro raced after the mule, the doctor following. After a while the man of medicine came up to the darkey who was out of breath, when the latter said: "Say boss, can't you give me one of dem *interjections* so dat I may be able to catch up to dat dar mule?" (Laughter.) There are some farmers who require that treatment to help them catch up to their neighbors. Mr. Fisher has very modestly told you that he has come up here to learn. If you should miss some of your best makers, you will know where to find them. You must not under-rate the Eastern Townships, because they comprise one of the best watered and best grazing sections of this country, and no place is more suitable for successful dairying. They have been making splendid butter there for years, and of late they have gone into the manufacture of cheese. The cows they have there have been bred from Guernseys and Jerseys in days gone by. They can afford to sell cheese for less than you get for yours, and still pay the farmers just as much for the milk.

You ask me about the system of selling. You arrange your own system and I shall adapt myself to it. I had thought, however, that if the factory men who spend so much time in trying to get the extra 1-16 of a cent, would spend as much time in endeavoring to improve the quality of their cheese, *the article would soon sell itself.* If you want to get more money for your cheese, *spend your time* and *thought* in deciding how the cows will get more and cheaper food; that you will get better cows, better milk, better dairies and better dairy utensils. You must not imagine that we buyers are in the business for the simple pleasure of it. We are there to make money. You dairymen can help yourselves and help us in a very simple way. It cost our firm $5,000 last year to cooper or repair boxes alone. Is not that a ridiculous condition of affairs? If I were a factoryman I would make a 75 ℔. cheese, and then I could afford to get a better box than I could put on a 60 ℔. cheese. I would get samples from all the box-makers, and select the one that would carry to China. You should have as good boxes here as they have in the Ingersoll district (and I am sorry to say that the Ingersoll boxes are not as good as they were two or three years ago). If you would have us pay you more money for your cheese, we must be able to handle your make with less cost to ourselves. We take every cheese out of the box when it comes to Montreal. And why? Simply because we we cannot trust you to leave out any defective cheese, and so every cheese must be taken out of the box. If you have a sour cheese or an off-flavored cheese, it is sure to be put in without being marked. You can depend on it that the honest factoryman will always get an honest price for his honest make. We think the fair plan is to pay a high price for good cheese, and pay for poor cheese just what they are worth.

A Member.—What is your opinion about stencilling cheese?

Mr. Ayer.—We would like to have the weights stencilled on. Some can make good figures with pencil, but as a rule we have to make the weights over again. As to putting factory brands on cheesee, to be perfectly frank with you it is almost impossible to do so. Every large house on the other side wants us to put their own registered brand on the cheese, and that is because the dealer does not want to have Jones, or Smith's name on the goods he handles but his own.

A Member.—How do you weigh your cheese?

Mr. Ayer.—We *do not weigh them.* The public weigher does it all and we take his weights.

The President.—Your cheese is weighed at the factory. You put it into a dry box, and you might as well expect a sponge to weigh as much some days afterwards.

Mr. Ayer.—In my experience there is not one factory out of three that has a perfectly correct scale and where they know how to weigh properly. The majority of factories are not built on a level, and if your scales are not on a level you must not expect them to weigh fairly.

A Member.—And then it cannot weigh the milk correctly?

Mr. Ayer.—But you do not move your scales all over the factory for milk. In closing this address I would desire to impress upon you the importance of four things. First, have tight-fitting boxes; secondly, use plenty of nails in fastening the box; thirdly, be sure that the box is not too tall for the cheese; and, fourthly, pay the boxmaker two to three cents each more for your boxes so he can afford to give you a perfect box.

A PLEA FOR DAIRY SCHOOLS.

Mr. Thomas Ballantyne, M.P.P., was next introduced by the President and said: I can assure you that it gives me sincere pleasure to see so many representative dairymen and buyers here to-day. I have been connected with dairying from its commencement in this country. I shipped the first hundred of cheese on the Grand Trunk Railway, and I was present at the first Dairymen's Convention held in Canada, which met at Ingersoll. I have been on the Board ever since, but whether I have been of service or not I cannot say. I do not think that I need do much in the way of trying to enlighten you along the old lines. We have all got over the first stage. But since my return from Great Britain recently I have been much impressed with the thought that if we are to continue improving the next onward move must be the establishing of dairy schools or more properly dairy experimental stations for educational purposes. Let us take a glance at the history of the industry with us. The manufacture of cheese was first carried on in Oneida and Herkimer counties in the State of New York. Soon we saw the American dairymen coming over to Canada, selecting our best milking cows and driving them across the lines, for in those days we had the old Reciprocity Treaty. When we saw the droves of cows going over there we asked ourselves, "Why should we not use them for cheese-making over here? We will have the same market for our surplus product, and if it pays them it surely ought to pay us." About that time the late Harvey Farrington, a native of Herkimer county, N.Y., settled in the county of Oxford in Western Ontario, and no man was better fitted to introduce the business of cheese-making into a locality. He was one of the finest men I ever knew. He was philanthropic and patriotic.

He had no narrow views, and anything he knew he was willing to impart to others. I honor the memory of Harvey Farrington. His views regarding cheese factories spread rapidly, and in a few years we were making cheese all over the country. But it was selling at a less price than that of Oneida and Herkimer counties, as it was of inferior quality. As I visited the cheese districts on both sides of the line I determined to learn how to produce the finest quality of goods, Canadian cheese then being at a discount in Liverpool, although a few factories here and there were making superior quality. We solved the problem, and to-day Canadian cheese is at a premium. We had our conventions, with papers and speeches and discussions, all very good in their way, but I never knew a first-class cheese maker who was made so merely because of his attendance at conventions. Actual work—demonstration—is the best means of instruction. The Western Dairymen's Association determined that it would not do for only a few factories to have a high reputation and sell at the highest prices. The makers then were anxious to improve, and were making an honest endeavor to do so. The question suggested itself to us, should we not employ some one to visit the factories and give instruction to makers? I wrote a resolution recommending such a move, and it was carried at one of our meetings. We were not altogether fortunate in the selection of the first person chosen; so much so that the Board was almost solid against continuing an instructor. In fact I was the only one the other way inclined, and I agreed that if the next attempt was not successful that I would pay the expense myself. He corrected his mistakes, and since that time a general improvement has been noticed. Our cheese soon sold for a cent or a cent and a half higher than Brockville cheese. But you followed us along this line of inspection and instruction, and now your cheese is getting as high a price as ours. And you have been making fine butter here when we were making butter that was unsaleable.

But let me go a little further. A few years ago when visiting the dairy districts of Scotland I was struck with the low average quality of their goods. There was every attention to cleanliness, and they had advantages which we have not here, yet their cheese was inferior. About that time a Scotch gentleman happened to be visiting me in Stratford, and he asked me what they could do to improve. I told him to form an association and get the best and most practical men they had to come together and discuss matters. I pointed out that it was the attention to detail that needed to be studied. Well, they decided to try and form an association. And let me here show you how small a matter may lead to great consequences. I gave this gentleman a cheese a year old and he distributed to his neighbors. "Here is Canadian cheese," he told them. "We have nothing like it. We must also improve." They formed a Dairy Association, which had its first meeting in Ayr at which I was present, with the Earl of Stairs in the chair. Acting upon our experience and suggestions they decided to appoint an instructor to visit the different districts giving practical lessons in cheese-making, and applied to myself to send them one, and there have been three different men, all from Canada, doing that kind of work, followed by the establishment of a dairy school at Kilmarnock in charge of Mr. Drummond, a Canadian whom I engaged for them. The result is the immense improvement in the quality of their cheese as shown by the recent dairy fairs held in London and Kilmarnock, in London taking every prize (except one) for which they could compete, including the Lord Mayor's cup. The newspapers in England and Scotland recognise our system as taught by Mr. Drummond and others as the cause of their great improvement, making a difference in prices of at least 15s. per cwt. At the dairy fair in London there were 109 entries of cheese, of which no fewer than 84 were from the pupils of our Canadian system.

Mr. Ballantyne then read extracts from *The North British Agriculturist*, *The Scotchman* and *Glasgow Herald*, these papers all giving credit for the great improvement in the quality to our Canadian instructors. That has advertised Canada more effectually than through any other means that have been used.

I visited several places in Scotland during the year past and was struck with the uniformity, the high quality and the great improvement generally in the character of the goods compared with former years. I can remember when [illegible] a few years ago our finest fall Canadian cheese would sell in London in preference to the Scotch make by 10s. or 15s. per cwt. When I was there this year they were paying for some of their home make 60s. per cwt., whilst our best Canadian was selling at from 44s. to 45s. per cwt., and I found some goods from a certain combination going at 43s. That is the result of teaching. Meeting a retailer one day I asked him why there was so much difference in the price as there was not a relative difference in the quality. He said: "I would like to sell the Canadian; it is a sixpenny cut and I have good profit in it, while I have to sell the other at eightpence. but then there is a perfection about it." I said to him, "How is it?" He replied, "The working people are well off now and they want the best." That is the reason. The cheese and butter we sold twenty years ago, some of it as strong as a horse's hind leg, cannot be readily disposed of now. While we must make more milk and cheaper milk, we must also attend to the make. Great Britain is now getting food from all parts of the world, and her providers are carefully studying her taste. She has been inundated with fresh pork from Norway and Sweden which retailed at 4¾d. per lb.; but depend upon it, the better the cheese the more of it will be consumed. I have noticed while driving for two or three days through a dairy district that there is an extra richness in the Old Country cheese. There appeared to be a large percentage of butter fat present. The cows were exclusively pure Ayrshires, and you can rest assured that they would not be bothered with a 3,000 lb. yielder. But they did not stint these cows in their food, for, although there was plenty of rich grass, they were feeding the animals drumhead cabbage and beans. There is no waste in those factories, and the curd could not be more carefully manipulated. Meeting the factor of the Duke of Portland he remarked to me, "The rental roll is not behind, and it is all owing to the improvement of the cheese," and consequent high price for the product. We have not been sufficiently impressing upon the people the importance of preventing the cream from rising. If once separated the milk can never afterwards be thoroughly assimilated. With a view to assisting the patrons of one of my own factories I gave them an aerator last year as a present, but I fear that on account of the cool weather they did not use it more than once on each lot of milk, and milk must be stirred sufficiently to prevent much separation of the cream. The rennet theory as an agent in the curing of cheese was considered an important factor, especially by the late Prof. Arnold, until it was exploded by Prof. Robertson whilst at the Ontario Agricultural College. I believe that our cheese has been selling at something more than a cent a pound higher than at Little Falls, New York. We have made improvements. Educational influences have been at work. Now, if we had a dairy school with good men in charge, cheese-makers wanting to be perfected in their business could spend a few days there and get advantage of the highest instruction. Factory men do not want to listen to second class men who may visit them, although I have known much improvement to result from the visits of some of our inspectors. But only the very best men could take hold of this experimental work. I know that our new Professor of Agriculture is very desirous of assisting us, and the country would sustain any action on his part which would aid in the development of agricultural knowledge of this character. My opinion is that we should have two schools in the province, east and west, to which makers could come for improvement. I do not mean that we would try to make them thorough dairymen, but it should be a place where makers could come and learn more. It takes a year or two to develop a good maker. Last year there was an immense quantity of very ordinary cheese in the west. But we had some very fine goods, too, and what one can do all may do. There is no maker who cannot spare a day or two to learn something at one of these dairy schools. It would be a school of enquiry for such a man. He would find his visit meant a step onward in still further improvement. The result of the shows held in Scotland have confirmed me in my views regarding the advisability of dairy schools. And you know that the trend of our conventions have been in this direction. It used to be nearly all talk about floating curds, building factories, etc., but we are now getting past that. However, we can see even now the benefits of these discussions on curd and rennet in the past.

The meeting then adjourned until the afternoon.

SECOND DAY—AFTERNOON SESSION.

The convention was called to order at two o'clock by Mr. Platt Hinman, who said: The president upon leaving the chair at noon said that it was doubtful if he would be able to be here, and desired me to take the chair as second vice-president. It is desirable that we should have the reports of committees at once so as to give us time to hear the addresses.

The following report of the nominating committee was then read and adopted:

Report of Nominating Committee.

President.—William Eager, Morrisburg.

Vice-President.—P. Hinman, Grafton.

Second Vice-President.—William Bissell, Algonquin.

Directors,—Div. No. 1, E. Kidd; No. 2, John McTavish, Van Camp; No. 3, Richard Murphy, Elgin; No. 4, D. Vandewater; Chatterton; No. 5, T. B. Carlaw, Warkworth; No. 6, H. Wade, Toronto.

Auditors.—James G. Foster, Moira, and M. K. Evertt, Easton's Corners.

Mr. Hinman.—No man is more sorry than I that Mr. McCrae, our late Vice-president has been forced to leave his home and go away for his health, as we believed that he would have been the next President. Mr. McCrae not being available, one of your oldest directors has been called to the presidency. I believe you have done wisely in accepting the report of the Nominating Committee. I shall now call upon the President elect to take the chair.

Mr. Eager—You have conferred a great honor upon me gentlemen, in electing me president of this Association. I shall endeavor to promote the interests of the Association to the best of my ability and judgment. I ask your sympathy and your co-operation, and if I receive these I feel hopeful of having some degree of success in anything we may put our hand to. (Applause.)

Other reports were called for, but the committees were not prepared to respond.

THE BOXING OF CHEESE.

Mr. Ayer, of Montreal, was then called upon to give a fuller description of methods of handling cheese.

I have been asked to say something more about this question of the boxing of cheese, as I did not go as fully into the matter this morning as some members of the Association desired. As to the kind of box required you need in the first place one having more nails. Use plenty of nails. Many cheese boxes go to pieces by the time they reach Montreal. You will often see a box with perhaps only five, six or seven nails in it. There should never be less than twelve nails in a lap, and there should be fifteen nails on the lid and another fifteen on the bottom. A box that has less than forty-two nails is weak.

The boxes are generally made too high for the cheese. Either make your cheese bigger or your boxes smaller, but do not allow any waste in the box. The bottom rim should be narrower than the top one—say 1¾ inches on the bottom and 2½ inches on the top. A box of cheese is handled or lifted on the average about twenty times before reaching England. If the box is so tight that you can jump on it without breaking it you may rest assured that that box will carry; but if the cheese is loose, the box being too large, it will break with anything like rough usage. I am asked about cap cloths. I favor their use, but do not press them under the bandage, but press them over the bandage *and leave them on.* Do not grease them all over, but let them go to market as handsome as possible. I have seen boxes in Montreal in the warm weather with the grease oozing out of them. Please remember that just as soon as the box is stained the price of a cheese is depreciated, no matter what the real quality of the goods may be, for there is something in appearance and style in the cheese trade as well as in any other. The factory should be built so that heat will never be extreme. Do not place a cheese where it will fry out.

A Member—Has not this same thing often resulted while in the cars in hot weather?

Mr. Ayer—If the cheese is well packed in a ventilated car there will be no frying out in the cars. We do not let the cheese remain in the car any longer than possible, and as the car is moving the greater part of the time there is generally a sufficient current of air. See to it, however, that your cheese is got off from the station as soon as is possible after it is placed on board the car. Do not use black scale boards because they are cheap, but get the best you can procure. In hot weather double scale board your cheese, both at the top and bottom, and unless there is unusual heat your goods will not be injured by the high temperature.

A Member.—The scale boards we use come from the buyers.

Mr. Ayer—Then if they are poor in quality go for the buyers. Do not permit the cheapness of the furnishings to spoil your cheese. It does not pay to ruin a first-class cheese by using cheap furnishing. Make your goods up stylishly. There is no style in daubing your cheese all over with brands such as "This is a full cream cheese." "Register Number 1000." And another brand on the box, "The High Flyer Factory, Germanstown Station, John Jones maker." You might as well expect a man to buy a white coat and have it branded all over with the name of the dealer he bought it of or a description of the quality of cloth in the coat. We make only full cream cheese in this country.

Gov. Hoard—If John Jones makes a skim milk cheese we must brand it so. (Laughter and applause.)

Mr. Ayer—There is an impression abroad that it does not matter if cheese gets wet, but if you saw the condition of some cheese in Montreal you would soon change your mind if you had been that way of thinking. The boxes should be covered with tarpaulin in rainy weather. If you have two scale boards and a good top cloth you can stand a good deal of wet. But let me say very plainly that a cheese with a single scale-board and no top cloth will lose a cent a pound in value if left exposed to the rain.

A Member—Why should not factorymen's weights of cheese be taken universally

Mr. Ayer—I believe it would be a premium to dishonesty if we were to take the figures of factory men. Some give proper weight, but others are inclined to be dishonest, and this method would leave no check on such. But if there is an intermediate person who has no interest in favoring either party, to come between you and us and the men in England, what can be fairer to both buyer and seller? As to brands on boxes, I repeat that we do not care to have factory brands on the boxes.

TEMPERAMENT IN THE DAIRY COW.

Gov. Hoard was warmly received as he rose to deliver his address on the above-named subject, which was illustrated by life-sized black and white pictures of various breeds of cattle. The speech was in the main a repetition of an address delivered in Ontario on one or two occasions, and which may be found in the reports of 1888 and 1889.

At the close of Mr. Hoard's address the following interesting colloquy took place:

Mr. Keeley.—Do you approve of small-sized cows for milking?

Gov. **Hoard.**—I do not approve of large cows if I can get the small cow to do the same work. I do not believe that size is any indication of talent. What I am for is a cow's talent, be she big or little. But I consider that if I have a cow weighing 800 lb. and another weighing 1,200 lb., each giving 300 lb. of butter, I can make more on the 800 lb. cow, as it requires less feed.

Mr. **Keeley.**—What I want to know is, what kind of cow is best for us?

Gov. **Hoard.**—If I did that you might fire up just as you would if I told you what kind of woman you should have. Men go according to their own taste generally. But if you want to pool with your neighbor and put your milk with his into a factory vat I can tell you. If you were a patron of mine in my own creamery, where we keep two sets of vats, one for the men who bring in rich milk and the other for the men who bring poor milk, and where we make up these two sets separately, I would say breed from the cow that gives the richest milk.

Mr. **Keeley.**—I would like both quantity and quality.

Gov. **Hoard.**—You cannot get that. You cannot load your gun to hit it if it is a deer and miss it if it is a calf. (Laughter.) But this gentleman is on the line of a question that affects you and me. He wants to know which is the best cow. I wish you could shape matters so that if you had a cow that gave milk of good quality it would be all right; but unless quality is recognised in a factory I would advise you to get the animal that gives the most milk of any quality. We established a Jersey and a Guernsey vat in our creamery and said that any cow having 50 per cent. of Jersey or Guernsey blood might go into it. We kept the milk separate and made up the butter from each of these vats, and it has all sold at one price, but the amount of butter each 100 lb. of milk makes is kept separate. The Jersey and Guernsey vat returned $1.05, while the common milk realised 85c.

Mr. **Keeley.**—The small cow is best for us.

A **Voice.**—What when she is dead?

Gov. **Hoard.**—You have had your return from her if she has been breeding. Mr. McPherson, a patron of ours, has a herd of 35 cows, Jersey grades, and we paid him last year in cash $63 a head, and returned him his skim milk, for which we would have been willing to pay him last year $12 per cow. His herd averages in weight 900 lb. to the cow, but the average yield is about 6,000 lb. of milk. Mr. Goodrich's cows have averaged 375 lb. of butter. The great question to be decided is how to increase the production without increasing the number of cows.

A **Member.**—This system of close inbreeding must tend to produce evil results.

Gov. **Hoard.**—It means intensified Jersey grades. You have intensified your strain. You have not a family of Jerseys that has not been made by inbreeding. But inbreeding is like a razor—it all depends upon how you hold it whether it cuts your beard or your throat. (Laughter and applause.) The Governor then proceeded to describe his stable, a mere verbal description of which it is impossible to give with clearness.

RE-ELECTION OF OFFICERS.

At the conclusion of the foregoing address Mr. **Warrington**, the late president, rose to a question of privilege and took objection to the election of officers earlier in the afternoon during his temporary absence. After some observations from Mr. Hinman and Mr. Carlaw the matter was reconsidered upon motion of Mr. Derbyshire, seconded by Mr. James Bissell, that the original report be now received and adopted. No objection being made the motion was declared carried.

REPORTS OF INSPECTORS.

The reports of the inspectors and instructors were then called for in the following order:

INSPECTOR RUDDICK'S REPORT.

Mr. President and Gentlemen:

I herewith submit my report, as instructor and inspector, for the season of 1890.

The district over which I was appointed includes the counties of Prescott, Russell, Glengarry, Stormont, Dundas, and Grenville, with parts of Leeds, Lanark, and Carleton.

Sixty-eight factories applied for inspection and received in all eighty-eight visits. These factories are scattered all over this large territory, and it will be easily seen that, to cover the work entailed a vast amount of travelling which was often attended with a good deal of difficulty, and no little discomfort.

The names of the factories visited with the number of visits at each are as follows:

North Gower, 1; Manotick, 1; Burritt's Rapids, 1; St. Andrews, 1; Monklands, 1; Black River, 2; Mille Roches, 1; Hawkesbury, 4; White Globe No. 1, 1; White Globe No. 2, 1; White Globe No. 3, 1; Rose & Co. No. 1, 1; Rose & Co. No. 2, 2; Rose & Co. No. 3, 2; Rose & Co. No. 4, 1; Lunenburg, 1; Fraser's, 3; Elma, 1; Bowman, 2; Archer, 1; Goldfield, 1; Newington, 1; Kemptville, 1; Millar's Corner, 1; Marlboro', 1; Silmser's Corners, 1; Spring Run, 3; Alfred, 1; Aultsville, 5; White Clover, 1; Leroy and Ogden No. 1, 1; Leroy and Ogden No. 2, 1; Glenroy, 3; Dalhousie Mills, 1; Breadalbane, 1: McCrimmon, 1; Glen Norman, 1; Cameron, 1; Bainsville, 1; North Augusta, 2; Moulinette, 1; Anderson's, 1; Oxford Mills, 1; Roebuck, 1; McKenna's, 1; Morrisburg Union, 1; Treadwell, 1; Plantagenet, 1; Morewood Union, 1; Bell's Corners, 1; St. Eugene, 1; Malakoff, 1; Eager's No. 13, 1; Pendleton, 1; Baltic Corners, 1; Vankleek Hill, 1; Iroquois, 1; Maple Grange, 1; Orchard Valley, 1; Algonquin, 2; Charleville, 1; Domville, 1; Centre Augusta, 1; Camerontown, 1; Willow, 1; Advance No. 1, 2; Advance No. 2, 1; Brinston's Corners, 1.

The total number of samples of milk tested was 3,850, among which I found 51 samples short of cream, and 32 samples adulterated with water, 83 cases in all.

In the thirty-two factories I found the milk all good.

Last year I reported 120 cases of adulteration and skimming in 52 factories, and only 11 factories where the milk was all good.

The plan adopted to punish parties sending milk not pure was to give them the option of paying into the factory a certain sum as damages, or going before a magistrate to answer the charge, and they invariably choose the former plan.

The damages were fixed at different amounts ranging from $5 to $50 according to circumstances. When it was convenient I usually had an interview with the parties, and failing that, I made it a matter of correspondence, or left it in the hands of the factoryman to deal with, always having a settlement made in writing or before witnesses.

Some of the parties admitted their guilt at once, while others would assure us that they could not account for the presence of water in their milk, and so on; but they were willing to settle without any trouble, and it happened somehow that the milk always came better in the future.

The cases were all settled in the manner mentioned above with the exception of a few, for there are still some managers who prefer to let these parties go unpunished rather than incur the risk of losing patronage or having any trouble. I am pleased to say, however, that they belong to a rapidly decreasing class, owing to the fact that inspection is becoming very popular with farmers of the right sort who see in it a means of protection against the thieving propensities of some of their neighbors.

The quality of the milk I tested shows a decided improvement over last year as far as purity goes, and in some factories the milk is better taken care of by the patrons than it formerly was. A large number of covered milk stands have been erected and aerators provided—all to good purpose.

I wrote to a great many patrons who were sending badly tainted milk, urging upon them the necessity for taking better care of it, and offering such suggestions as I thought most likely to help them.

A number of new factories were put up in my section last year, and I must say that they are better constructed than the average factory. Some of the old ones have been much improved also; but there are still far too many that as regard location, build and equipment are in no way fit for the purpose of making cheese in.

One of the chief troubles of cheese-making during the summer was a bad flavor which seemed very hard to get rid of. I was inclined to attribute the prevalence of this flavor partly to the peculiarities of the season. Much of the pasture being winter-killed, and very wet weather coming on early, an unusually large quantity of rank, weedy grasses sprang up, and being eaten by the cows imparted their rank flavors to the milk.

The bad flavor of many cheese, however, may be traced to causes in and around the factory itself. Fully one-half of the factories I visited were not provided with a proper supply of good clean water, and at least fifteen were using water positively unfit for any purpose whatever.

The drainage is so imperfect at some factories, that the waste water and whey run out on the ground and not being carried away soak into the ground, which may at first filter it somewhat before it reaches the well, but the time soon comes, when it is so saturated, that it no longer performs this function and the result is a compound in the well, which to use where good clean water is an absolute necessity cannot have any other than a deleterious effect.

It is hardly within the scope of a report like this, to deal with anything outside the bare facts that have come beneath my notice, but I enlarge a little on this matter because I realise its importance, and the growing necessity for remedying the evil. I repeat it is a growing necessity because it is evident from the causes aforesaid that where the evils exists at all it is constantly getting worse.

The condition of some of the vats in factories I have visited also tends to create bad flavors in the cheese. I speak of those vats where the tinning is worn off more or less, leaving the iron bare in places. When it gets bad these spots where the tin is off impart a very objectionable smell to the curd. It is after the whey is run off and the parts exposed to air that it will be noticed more particularly. I don't know the scientific explanation of this thing, but presume it is the same trouble which occurs when certain dishes of food are cooked in iron vessels.

I find also that the whey tanks are not always kept as clean as they should be, some of them not being properly cleaned and scalded once during the whole summer. Since the whey from these tanks has to be carried home in the milk cans it is very important that they should be kept clean, and were they kept so I venture to say that there would not be so much cause for complaint against the practice of hauling whey home in the cans, inasmuch as I believe this to be the real evil itself.

Twelve of the factories which I visited were models of cleanliness, seven were positively filthy and the balance were not any cleaner than they should be.

The ventilation of curing-rooms is not attended to as it should be. Many of the factories are not provided with facilities for so doing, and even where they are it is often neglected. I have urged upon all the importance of this matter.

In conclusion I wish to take this opportunity of thanking all factory men, makers and others whom I came in contact with in the performance of my duty, for their courtesy and friendliness whenever I met them.

J. A. Ruddick.

Lancaster, January 1st, 1891.

There was one matter I overlooked in my report. In my visits to to the factories I find that 50 per cent. of the thermometers are not correct. I find thermometers out 7° when tested as high as 98°. Cheesemakers find it hard to get reliable instruments. I hope that some of our enterprising dealers will do something to remedy this evil.

Gov. Hoard.—You speak of patrons watering milk. What percentage of fat have you established as being honest?

Ins. Ruddick.—I may say that we have not established any percentage of fat. We test the milk, and if we feel assured that it comes to the factory as it comes from the cow we have to let it pass.

Gov. Hoard.—Is this a really good state of affairs?

Ins. Ruddick.—It is not a good state of affairs, but under our present conditions we cannot do much better.

Gov. Hoard.—In Wisconsin we have established a minimum standard of fat—3 per cent—and say that no milk shall go below that, and it has helped us greatly in deciding what to do. If the milk is below that standard the owner has to stand the loss whether he skims it or the cow skims it. You also speak of a flavor in your cheese. You attribute it to bad feed. Have you examined the water drank by cows in certain herds?

Ins. Ruddick.—I believe that bad water has a good deal to do with it, and I have become convinced of that matter by a visit I made to the Eastern Townships some time ago where nearly all the water the cows drink is perfectly pure.

Mr. Ballantyne.—How do you positively ascertain the impurity of the milk so that you can establish charges against them?

Ins. Ruddick.—I may answer that by explaining as briefly as possible our method of testing. I use the lactometer and the cream gauge. Of course we get nothing but the volume of the cream, but by bringing the milk with the help of ice to a temperature of 40° I have been able to get at it very closely. I occasionally use the lactoscope. I compare the record of the factory milk with the milk drawn from the cows about the same time. We make both a farm test and a factory test.

A Member.—Can the milk that is left in the milk can or the whey tank be incorporated into the cheese?

Ins. Ruddick.—I do not think that cheese can be made without some of the cream going into the whey tank.

Mr. H. BISSELL.—The cream that rises on the can is not the same as that seen in the whey tank. The acid forming in the whey has a tendency to meet the butter fat in the curd. If the cheese is properly made you will find very little cream in the tank. How do people make full cream cheese for a fair but by adding cream to a vat? So it will be seen that cream can be incorporated into cheese.

Mr. AYER.—There are many farmers who have an idea that the cream on top of the cans can never get into the cheese, and therefore it is not a sin to take it off. (Laughter). If the gentlemen here to-day can be convinced that it goes into the cheese then their consciences will prick them and they will not offend again.

Mr. BALLANTYNE.—I was very much pleased with the Inspector's report. He appears to have done his duty fully. We were also troubled with those who were skiming milk. We had a better yield when we were taking the milk to the factory twice a day. The milk can be more satisfactorily taken to the factory by the farmer than by the factoryman. Where we had running water we generally had an agitator working which went from side to side and prevented the cream from rising. In a great many factories we made cheese twice a day, and we had good results. The Inspector's report has emphasised the importance of having experimental and educational stations for dairymen. It is utterly impossible that inspection can be efficiently done where the inspectors have to cover so much distance. Now if we had these dairy schools in charge of the best available men, running winter and summer, it would be a good thing, and thorough instruction can be given no other way. We have reached that stage where winter dairying must be made our chief aim. I was not always of this view. I at first thought it would interfere with our cheese business, but I have been converted in this matter. The demand for butter is increasing and will continue to increase. With all respect to our American friends our Canadian butter is better than the American, and has commanded a higher price in the British markets. We will have a home market for fine butter larger than we can meet for many a day. In the west we used to make provision for the winter's butter—we purchased ours in Morrisburg. But butter is not like wine, it will not improve with age. I had Babcock's separator brought to some of my factories, and showed all interested that we were able to ascertain the exact percentage of cream, and we have decided to pay patrons according to quality. On Monday three young men started for Madison to take lessons in the dairy school in operation this winter. And one of the best makers of Ingersoll recently said to me "I do not know a year when I would not like to go and spend a few days getting points from those who are interested in this great work of dairying." I am fully convinced that the next step we should take in developing the dairy interest would be to make cheese in the summer and butter in the winter, and thus keep our factories going all the year around. Speaking of the yield per cow, I had a heifer calf last January which gave me in twelve months 11,000 lb. of milk.

Mr. KEELEY.—Should not the Association arrange soon to have the dairy schools start so that the cheesemakers might get some instruction before the next season?

Mr. BALLANTYNE.—Large bodies move slowly. I believe that if the instructors were under Prof. Robertson's control the work would be given a prestige that this Association could not give it.

INSPECTOR PUBLOW'S REPORT.

To the President and Directors of the Dairymen's Association of Eastern Ontario:

GENTLEMEN,—Having been appointed instructor and inspector by this Association for the season of 1890, I beg to submit to you the following report:

The district to which I was appointed comprises the territory lying between Kingston and Ottawa, west of the B. & O. Railway.

The number of factories in this territory are, as nearly as I can judge, about 150. Of this number over 100 made application for instructions and inspection. I had as many applications in before I began as would have fully occupied the time allotted to the whole work, as some of the applications called for from three to six visits each. This accounts for those who made application for instruction later on not receiving the same.

I commenced work on the 15th day of May and ended on the 10th of October. During this period I was 117 days in the employ of the Association, 94 days of which time I spent in giving instructions and testing milk in factories, the balance of the time being taken up in travelling, etc. The amount contributed by the factory men for the service of my inspection was $170.

The following are the names of factories which received instruction and the number of visits to each: Palace, 2; Oak Leaf, 2; Riverside, 4; Stanleyville Model, 1; North Shore, 4; Singleton, 2; Clear Lake, 3; Model, 3; Centreville, 3; Salem, 2; Lake View, 2; Maberly, 1; Brook-side, 3, Watson's Corners, 3; Hopetown, 2; Middleville, 3; Rosedale, 2; Mississippi Pride, 1; Mississippi, 2; Farmersville, 1; Fairplay, 1; Balderson's Corners, 2; Harper's Corners, 2; Bathurst Mutual, 2; Lombardy, 2; Smith's Valley, 1; Reliable, 1; Frankville, 2; Plum Hollow, 2; Farmer's Choice, 1; Delta, 2; Philipsville, 2; Elgin Model, 1; Washburn, 1; Lyndhurst, 1; Morton, 1; Seeley's Bay, 1; Bay, 1; Escott, 2; Warburton, 1; Rapids Valley, 1; Anvern, 1; Roseville, 2; Myers, 1; Forfar, 1; Fermoy, 2; Ardmore, 2; Franktown, 1; Beckwith, 1; Hazledean, 1; Golden, 1; Pakenham, 1; Clear Spring, 1; Holland, 1; Westport, 2.

In said factories I tested 5,640 samples of milk and found 72 cases of adulteration and skimming; 71 of those cases were settled by the parties paying into the treasury of their own factory, fines of from $5 to $50 each. In only one case had we to take legal proceedings, the party refusing to settle to our satisfaction. The fine and costs imposed in this case amounted to over $100. The amount realised by the patrons of these factories, from said fines, was $710.

One plan we took this year to try and raise the standard of milk and so to ensure the manufacture of finer cheese, was to post upon the walls of the factory a copy of the test, shewing the condition in which each patron's milk was found. This was objected to in some cases, but only by patrons whose milk was below the average quality of the factory, some of them maintaining that the instruments used were not reliable. To prove the correctness of the instruments, I sent samples (at different times and from different factories) to the Government analyst, at Ottawa, to be analysed, and in every case the test was sustained, the analyst showing that in some cases the percentage of adulteration was even greater than had been accredited to them, and in no case was there less.

The managers of many of the factories are to be congratulated on the improvements made to insure the manufacture of finer cheese, also on their endeavor to secure the very best makers, and their willingness to pay good wages.

I regret to say, however, that some factories are still in a deplorable state, although I have been notified that a number have been put in better condition for the operations of next season.

I think it is unnecessary for me to add anything more to this report. If any person desires information on any subject not taken up, I shall be pleased to answer any questions if it is in my power.

G. G. PUBLOW.

MR. JOSHUA LEGGE.—I have been very much pleased with the reports of the inspectors. I have been a good deal through the country, more especially that section where Mr. Publow has been inspecting the factories, and the reports I have heard while there were that these factories have greatly benefited by the instruction he has given. The chief complaint is that the territory is too large for the inspectors to fully cover. There is present here a delegation from the Kingston district to ask that additional inspectors be appointed for the section from Napanee to Kingston. With reference to the schools of instruction in dairying that Mr. Ballantyne has brought before the meeting, I would say that the matter was discussed a few years ago. At that time I took the trouble to get up a petition that such schools should be established in different places, but it was decided that one be established at the Ontario Agricultural Farm, and that the matter be left over for a future time. I have the honor to move the following motion:

"Moved by Mr. J. Legge, seconded by Mr. H. M. Johnson, that this Association request the Minister of Agriculture of Ontario to have established in this province schools for the purpose of educating butter and cheesemakers in experimental and general dairy work."

MR. H. M. JOHNSON.—In seconding the resolution I feel as though I should say one word for the county of Prince Edward, for which, I am sorry to say, I appear alone to-day. For the past two years we have felt that we need the services of instructors more than we do inspectors.

The motion was carried unanimously.

INSTRUCTOR BAILEY'S REPORT.

In presenting his report Mr. Bailey prefaced it as follows: I was very glad to hear the remarks made by Mr. Ballantyne. I have wished for years that schools of instruction in dairying might be provided for the young men of this province, where they might receive the highest class of instruction in advanced dairying. I was pleased to see the unanimous way in which the motion referring to this matter was adopted. I have been interested in the dairy business for nearly thirty years. I travelled over considerable territory this year that I did not visit last year, and in some instances I found things in a very bad state, involving a large amount of rather unpleasant work. I am glad to say, however, that I found a vast improvement in the territory I covered last year. The improvement was noticeable not only in the quality of the goods but also in the cleanliness of the factories. In cases where the factories were not up to the mark, I have tried to coax rather than drive. I have endeavored to show that a bad condition of affairs at the factory not only was detrimental to the welfare of those working there but also to the health of those who consumed the goods. No man likes to deal with a dirty baker who makes his bread in a filthy place, and it is just as necessary and important that cheesemakers should have clean quarters, utensils, etc., if they would have a good, saleable article and good customers. When you find in a factory a can the bottom of which has not been washed for a long period, what can you expect from the patrons ? Mr. Bailey then complimented Gov. Hoard as an editor and speaker, and proceeded : Canadian cheesemakers should amalgamate and form a society, and in that way they could provide for getting paid for the work they do and doing the work thoroughly. In the *Mark Lane Express* recently it was said that the beautiful Canadian cheddars were among those awarded prizes in various parts of England. We do not want this pulling and hauling and struggling to bring down the prices paid to makers, or we cannot manufacture such cheese for the British markets. Makers should have meetings to talk over their immediate interests, just as well as any other class of the farming community who now meet. So far as taint is concerned, I have found that in nine cases out of ten the cows have been drinking impure water. I have also found thermometers very unreliable. My report is as follows :

BROCKVILLE, January 8th, 1891.

I beg leave to submit the following report for the season of 1890 :

Number of days employed, 178, divided as follows : inspecting milk and instructing, 123½ days ; driving in the different counties, 8½ days ; travelling by railway, 5 days ; Peterboro' Board of Trade, 2 days ; Campbellford Board of Trade, 2 days ; Belleville Board of Trade, 2½ days ; attending committee meetings, etc., Belleville, 6 days, writing, attending court, etc. in connection with trials, etc., 28½ days.

Number of cases of adulteration found coming to the different factories visited : county of Hastings, skimming, 23 ; watering, 9 ; watering and skimming, 1 : county of Northumberland, skimming, 28 ; watering 12 ; countyof Peterboro', skimming, 49 ; watering, 11 ; skimming and watering, 1 : county of Victoria, skimming, 12 ; watering, 8 : county of Haliburton, skimming 3 ; watering, 4 ; watering and skimming, 1.

Number of cases fined, as far as heard from up to date 111 ; lost, 2 ; tried, but no judgments as yet, 5 ; admitted and not fined, 5 ; notified and no answer, 8 ; notified and no proceedings taken yet, 16 ; light cases, 15.

Amount of fines imposed, as far as heard from, $1,507.00, half of which goes to the factories and the balance to the Association.

I cannot give the exact amount paid in from all sources, as only a small part has been paid to me, as can be seen by the following account with the treasurer :

Paid to the treasurer by myself, fines from Haliburton county	$19 00
" " " " Northumberland county	53 50
" " " " Hastings county	22 50
Total amount received from the factories as paid to me and handed over to treasurer	245 89
Mr. Potter's annual subscription to Association	1 00
	$341 89

The balance of fines and factory subscriptions has been paid to Mr. Warrington or Mr. Daly, the treasurer.

Account against the Association for labour, etc :

178 day's work at $5 per day	$890 00
Railway fare, attending court, etc	26 60
Ether, alcohol, etc	8 85
Telegraphing, postage, etc	3 74
Paid witness as per receipt	2 50
Costs in trial	10 20
	$941 89
Received from treasurer as per accounts to date, cash, etc.	$941 89

Number of cheese factories visited for inspection, etc., 265. Number of samples of milk tested for past season with lactometer and cream gauge, 5,216. Tested with the ether and spirit test, 534. Total tests made, 5,750.

Number of samples tested and found below 3 per cent. of butter fat, as shown by the ether test, 200.

A. E. BAILEY,
Inspector, etc., Campbellford, Ont.

INSTRUCTOR ROLLINS' REPORT.

I now take much pleasure in submitting to you my second report as milk inspector and instructor for the western division of the Eastern Dairymen's Association. I visited 78 factories, leaving instructions and testing milk, and I am sorry to say that three-fourths of the factories are totally unfit to manufacture a first-class article of cheese, especially in the colder parts of the season. The making rooms are too open and lack the proper means of heating the room or keeping the curd at the proper temperature. I am pleased to report that factories built of late years are much better constructed than formerly, and some of the factorymen are repairing their old factories so as to make them more comfortable. During the past season cheesemakers were troubled very much with gassy curd. This kind of curd is much harder to manage when it cannot be kept at a high temperature. There is not one factory in twenty where I visited this past season that has the proper means of heating the curd without injuring it. All factories should be supplied with racks to let down in the vats, or a curd sink properly constructed, with a steam or pipe attached, so as warm water can be kept under the curd, and if the water be kept at a proper temperature it will keep the curd at a proper and even temperature. I have seen cheese this summer ruined by working it too much on the hot vat, with dry steam running under. I find that a good many cheesemakers neglect ripening their milk, and the consequence is that it works too slowly. This same result happens when they drain the whey off before the proper amount of acid has been developed in the curd. I think it best not to stir a gassy curd while the whey is running off, and leave the curd rather moist until the acid is well developed. I have handled gassy curds very successfully by shoving the curd to each side of the vat when the whey is running off, and let it mat in that state for a few minutes, cut it and keep turning it until it is pretty well drained, then pile it deep in the end of the vat and turn it occasionally until there is quite a further development of acid. It should then be put through the mill and stirred and aired for a few minutes, and if too cold it should be warmed. It should next be piled and allowed to mat again, and put through the mill again when the acid is sufficiently well developed, which can be easily ascertained by the feeling and texture of the curd. It should then be salted and allowed to mellow down before being put to press. The cheesemakers and proprietors of the factories are not the only ones to blame for gassy curds. The primary requisite of good cheese is good milk. There cannot be too much importance attached to supplying milk to a factory in good condition. The indifference and sheer carelessness of some patrons is surprising, and until this state of things is improved it will be difficult to manufacture a fine article of cheese. During the past season, while going through the country, I found a very large proportion of milk kept in foul places some, in spite of all that has been said against it, so close to pig-stys that the whey is turned off the milk stand into the pig trough. In other instances milk stands were close to barn yards from which all sorts of objectionable odors were coming, such as manure heating, etc. Many do not pretend to strain their milk, and in examining cans of some factories I found some so dirty for the want of washing and scouring that it would be impossible to send milk in good condition in them. Another serious evil is that some cows are allowed to drink stagnant impure water. Some during winter keep cows crowded in ill ventilated stables, causing their systems in the spring to be fevered and their blood impure, and this, I think, has a great deal to do with the present state of the milk.

When factories were first started in Madoc township, where I first worked in a factory, I was four years in the business before I saw gassy curd, and then only occasionally. At that time few cows were ever stabled. I find, also, that where factories have just been running two or three years, in the north of the county, there are instances of some makers that have been at work two seasons and in that time had only one or two gassy curds.

I have dwelt at some length on this because of its great importance, and while on the subject of cheese making allow me to say that many of our cheese are too dry, lacking that fine buttery texture that all good cheese should have. I think this can be greatly remedied by not hand stirring so much and by leaving more moisture in the curd.

I am pleased to report that I find a marked improvement in the milk, so far as its being tampered with. I do not think I found this season one for every twenty-five I found two years ago, that, that in my judgment was tampered with more or less. I tested about three thousand samples and had only occasion to complain on eighteen.

There is another point I should like to refer to and that is the curing of cheese in the fall. I visited some factories last fall where there was cheese not more than one day or two out of the hoops and the temperature in the curing room as low as 34° Fahrenheit. Now, it is surprising that any cheese maker, after making a good cheese will allow it to spoil in the curing.

I have worked for the Association 145 days, as follows: 80 days testing milk, 37 days instructing, 14 days attending to prosecutions, 14 days visiting factories, and traveling between same. Also paid out $5.38 for tin box, test tubes, postage, telegrams, etc.

ROBT. ROLLINS.

BROCKVILLE, January 7th, 1891.

Mr. ROLLINS added the following remarks: Let me refer briefly to the lack of cleanliness at some factories. The filthy condition of a few factories is really surprising. In some cases the construction of the floor makes it almost impossible to keep the premises sweet and clean. The owners should be compelled to improve matters in this respect. I said to one or two cheese makers, if I was a buyer the very first thing I would do when I reached the factory would be to step into the making room, and in your case I would go into the curing room prejudiced against the cheese. Some have good floors, but do not try to keep them clean. Some weighing cans and floors are scrubbed only once or twice a week.

TREASURER'S STATEMENT.

P. R. Daly, Treasurer, in account with the Eastern Ontario Dairymen's Association.

Receipts.

Jan. 9—	To balance from 1889	$269 36
	" " Inspector's fund, 1889	21 30
	" Members' fees, 1890	205 00
May 20—	" Government Supplementary, 1889	500 00
July 15—	" " Grant, 1890	2,000 00
	" Inspector's fees from factories, Western Division	365 89
	" Fines, Western Division	769 50
	" Inspectors' fees from factories, Eastern Division	865 00
	Total receipts	$4,996 05

Expenditures.

	By paid Expenses Convention at Belleville	$394 10
	" Balance due Inspectors, 1889	114 00
	" Burdette, law costs from 1888	130 00
	" Delegate to Central Farmers' Institute	10 00
May 20—	" Expenses Executive Committee at Belleville	19 50
	" Delegates to Ottawa	37 00
" 29—	" Board meeting at Belleville	51 50
Sept. 24—	" " "	75 50
	" Grant, Cheese and Butter Exhibit	250 00
	" Judges for same	71 00
	" Secretary Ashley's salary	140 00
	" Inspector R. Rollins	730 38
	" " A. E. Bailey	941 89
	" " J. A. Ruddick	672 00
	" " G. G. Publow	702 00
	" Expenses Committee Eastern Division	41 00
	" Dempsey, expenses in connection with Inspectors	50 00
	" Rebate of fines to Factories	80 25
	" Treasurer's salary, $25; postage and stationery, $5	30 00
	To balance in Treasurer's hands	455 93
		$4,996 05

AUDITORS' REPORT.

We have examined your Treasurer's books and accounts as presented in the foregoing statement, and have found the same correct, and in accordance with vouchers produced.

We are pleased to notice an increase in receipts from factories to assist in defraying the expenses of inspectors, showing a disposition on the part of factorymen to assist the Association and the Government in securing the services of thoroughly skilled and competent instructors and inspectors, in order to hold our present *first place* as manufacturers of the finest average cheese in the markets of the world.

We would urge the importance of the Association and Government devoting all the money they possibly can for the building up and carrying on this grand industry.

Respectfully submitted,

M. K Evertt, } *Auditors.*
J. G. Foster, }

Brockville, January 7th, 1891.

Total Receipts	$4,996.05
Total Expenditure	4,540.12
Balance in Treasurer's hands	455.93

Mr. Evertt.—I think there are some gentlemen here who would like to ask questions. One of them has said he understood that there were some $200 from the Kingston Board, but there is no mention of it.

Mr. Daly.—I believe that all that has been received has gone into the Report along with the factory inspectors.

Mr. Johnson.—The reason I wanted to know was that the inspector was doing good work in Prince Edward and was called away, and I understood that he was offered $200 for so going, and I did not see any account of the work.

The Treasurer's and Auditors' Reports were then adopted.

REPORT ON DAIRY UTENSILS.

The Report of the Committee on Dairy Utensils was as follows :

Your Committee find that there are several aerators on exhibition, and while we do not propose to recommend any particular kind, we wish to urge once again upon all dairymen to adopt them more generally. We also find a cheese vat faucet, exhibited by D. M. Macpherson of Lancaster, which is the best thing of the kind we have seen. This Committee would also recommend that the exhibition of dairy utensils be more encouraged in the future, and that better facilities be afforded to exhibitors for showing off the merits or demerits of their respective machines.

Upon motion of Mr. Daly, seconded by Mr. Derbyshire, the report was received and adopted.

DAIRY EXPERIMENTAL STATIONS.

Moved by Mayor Derbyshire, seconded by D. M. Macpherson, and resolved :

That whereas the ever growing magnitude of the cheese trade is creating new problems and difficulties in the production of milk and the manufacture of cheese and butter, which the dairymen in their private business endeavors find themselves unable to solve ; and whereas the Provincial Government in the past has given liberal assistance to associations and to the dairymen, for the purpose of assisting in the dissemination and the giving of assistance through inspectors to both the producers of milk and the manufacturers ; and whereas the Dominion Government has established the office of the Dairy Commissioner for the Dominion, charged with the duty of carrying on investigations with economical methods in the production of the finest quality of dairy goods, this Association in convention assembled heartily recommends to the farmers of the province the advisability of developing the practice of winter dairying, whereby they might add to the profits of cheese making in summer the enlarged profits from butter making in winter.

The Dairymen's Association of Eastern Ontario respectfully requests the Ontario Government to continue its financial assistance to this Association upon an increased scale, so that the work of the Association might be prosecuted with enlarged vigor and success.

Resolved further, that this Association urge upon the attention of the Dominion Government, the advantage and need for the extension of the work of Dairy Commissioner by the establishment of branch dairy experimental stations under the direct supervision of Prof. Robertson, for the purpose of carrying on such investigations into the principles and practices of cheese-making and the encouragement of improved butter making during the winter, by fitting up these stations for that purpose and by the making of trial shipments of fresh made butter in suitable packages to foreign countries, in order to establish a reputation there and to create a demand, at the highest prices, by demonstrating the excellence of its quality.

Resolved further, that copies of this resolution be forwarded to the Minister of Agriculture for the Dominion and the Minister of Agriculture for Ontario, for their favorable consideration.

CANADIAN CATTLE TRADE.

It was also moved by Henry Wade, seconded by M. K. Evertt, and resolved :

That whereas the trade in the export of live cattle from the Dominion of Canada has been gradually extending during the past few years and has been a source of profitable income to our farmers and carrying companies, we, the Dairymen's Association of Eastern Ontario, hereby record our judgment that the robust health of the cattle of Canada, their freedom from all dangerous diseases and their general excellence of quality, is proverbial, and that the people of England need not fear that the health of their stock will be injured by the arrival of our cattle on their shores. We regret very much that the weather has of late been so inclement on the ocean that a great many of our cattle have perished. This, however, does not establish the presence of any disease in Canada, and we hope that Mr. Plimsoll will remain in Canada long enough to be convinced of this fact. It will be a very serious matter for the landing of live cattle to be stopped in England, as we cannot compete with the rancher in the North-west, where they can raise cheap corn in the feeding of cattle.

RESOLUTIONS OF SYMPATHY.

Resolutions of condolence with the families of the late Wm. Weld, of London, Ont., and James Millar, of Spencerville, were passed, as was also one of regret at the absence, through illness, of 1st Vice-president, F. H. McCrea.

CLOSING WORDS.

Mr. **Derbyshire**.—I have been delighted with this Convention. The speakers have handled their subjects ably, and the reports of the inspectors and instructors have been very satisfactory. I believe the instructors have gone more fully into their work than ever before, and a good influence is sure to result. I am looking for more vigorous work in the future as the result of this gathering.

After votes of thanks to the various speakers, the press and to the court house authorities for the use of the chamber, the Convention was adjourned.

COMPLIMENTARY BANQUET.

In the evening a complimentary banquet was tendered the visiting members of the Association in the Robinson House by the citizens of Brockville. The spread was an excellent one, and the toast list brought out many eloquent, practical and witty words from representative men. The Mayor of the city presided.

II.—DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO.

OFFICERS FOR 1891.

President - - - - - - Thos. Ballantyne, Stratford.

1st Vice-President - - - - - John Geary, London.

2nd Vice-President - - - - - William Messer, Bluevale.

Directors.

Division No. 7.—Robert Cleland, Listowel.

Division No. 8.—Harold Eagle, Attercliffe.

Division No. 9.—E. Casswell, Ingersoll.

Division No. 10.—John Ballantyne, Pine River.

Division No. 11.—Alex. F. McLaren, Stratford.

Division No. 12.—William Symington, Camlachie.

Division No. 13.—John Prain, Harriston.

Secretary - - - - - - - C. E. Chadwick, Ingersoll.

Treasurer - - - - - - - J. C. Hegler, Ingersoll.

Auditors - . - - - - - { John S. Pearce, London.
John Robertson, Gladstone.

Representative to Industrial Fair, Toronto - Benjamin Hopkins, Brownsville.

Representatives to Western Fair, London - { James Carmichael, Arva.
John S. Pearce, London.

LIST OF MEMBERS

FOR 1891.

NAME.	POST OFFICE.
Archibald, L. C	Antigonish, N. S.
Atkinson, M.	Melbourne.
Brown, M. R.	Appin.
Blair, J. C.	Woodstock.
Ballantyne, Thos.	Stratford.
Ballantyne, R. M.	Stratford.
Brown, H.	Beaconsfield.
Barr, G. H.	Culloden.
Bothwell, Wm.	Woodstock.
Butchart, J. M.	Burgessville.
Brown, R. M.	Fordwich.
Brodie, John.	Mapleton.
Ballantyne, T. J.	Listowel.
Bayne, Perry C.	Alberta, N.W.T.
Burgess, Geo.	Bluevale.
Bonser, Jas. H.	South Middleton.
Bean, W. H.	Eastwood.
Bates, E.	Mount Elgin.
Baxter, John.	Beamsville.
Caddey, Thomas.	Ingersoll.
Cranston, R.	Lawrence.
Cuddie, Robert	Woodstock.
Cleland, James.	Listowel.
Chown, Richard	Youngsville.
Corless, John.	New Durham.
Copeland, J. W.	Eastwood.
Coneybeare, Geo	Oxford Centre.
Dickinson, Joseph	Springfield.
Durand, Geo.	Belmont.
Duncan, Louis	Uttoxeter.
Dunham, Peter	Innerkip.
Drummond, R. J.	Kilmarnock, Scotland.
Dobell, John.	New Salop, England.
Dillon, T. J.	Ingersoll.
Edgar, Thos. S.	Brussels.
Elliott, James	Tilsonburg.
Eagle, Harold	Attercliffe.
Fulton, John.	Brownsville.
Fierheller, C. S.	Fordwich.
Fero, Walter.	Eden.
Farrington, J. L.	Norwich.
Farrington, G. G.	Norwich.
Gillard, Wm.	Stratford.
Geary, John.	London.
Gray, Jas. A.	Atwood.
Grieves, Jas. L.	Verschoyle.
Green, P. G. C.	Sheffield.
Holmes, D. E.	Embro.
Hopkins, Jas. E.	Brantford.
Hoover, A. H.	Springfield.
Hopkins, Benjamin	Brownsville.
Hodgson, H. A.	London.
Henderson, W. G.	Marlett, Mich, U.S.
Harmer, Luverne.	Bright.
Hainer, J. H.	Springvale.
Haines, James.	Mount Elgin.
Isaacs, John R	London.
Johnston, E.	Arva.
James, J. A.	Nilestown.
Johnston, Robert	Bright.

List of Members—*Continued.*

Name.	Post Office.	Name.	Post Office.
Jones, A. G	Glenallan.	Rusling, John	Boston.
Kidd, M.	Seville.	Riley, C. W	Ingersoll.
Kelley, Thos. E.	Otterville.	Robertson, John, jr	Gladstone.
Keilor, Alonzo	Wallacetown.	Soper, C.	Guysboro'.
Leitch, J. A.	Lucknow.	Smith, E. P.	Tilsonburg.
Lane, J. F.	Crombie.	Snell, Robert	Norwich.
Lee, S. R.	Hickson.	Slawson, C. H.	Ingersoll.
Louden, W. C	Putnam.	Sinclair, D.	Harriston.
Lockhart, M. T	Walmer.	Stewart, Chas,	Flesherton.
McCrimmon, S.	Otterville.	Schragg, C	New Hamburg.
McCombs, Jas..	Kelvin.	Symington, Wm.	Camlachie.
McLean, Wm	Crinan.	Scott, J. W.	Sparta.
McCallum, H.	Gladstone.	Stacey, James H.	St. Marys.
McBain, J. W	Atwood.	Smith, C. W	Centralia.
McLaren, Wm.	Avening.	Sherman, Alfred.	Bismarck.
McDermott, Jas	Tiverton.	Saul, J. L.	Crumlin.
McGillivray, M	Listowel.	Travers, C. C.	Straffordville.
Marr, Enos.	Fork Roads.	Talbot, Charles	Crumlin.
Morrison, James	Henfryn.	Talbot, Leonard.	Crumlin.
Martin, R.	Cassel.	Taylor, John F	West Lorne.
Miller, A.	Walmer.	Thompson, George	Bright.
Matheson, Wm. A..	Northville, Mich. U.S	Thompson, Wm.	Arkona.
Noxon, James	Woodstock.	Wilson, H. E	Dorchester.
O'Mara, Thos.	Avon.	Whitelaw, R.	Woodstock.
Ostrander, W. A	Dutton.	Wilford, N.	Salford.
Ostrander, C. A.	Lyndoch.	Walden, James	Maple Grove.
Parker, A.	Rockford.	Wallington, Frank	Tilsonburg.
Phelan, Daniel.	Woodstock.	White, H.	Pine River.
Patterson, James	New Durham.	Webster, William	St. Marys.
Patterson, J. G.	Wingham.	Wood, William	Molesworth.
Pickard, A.	St. Marys.	Wilkison, J. B.	Verschoyle.
Pearce, J. S	London.	Williams, J. F.	Culloden.
Ritchie, J. T.	Otterville.	Wilford, John	Shakespeare.
Robertson, John	Gladstone.	Wooliver, W.	Avon.
Robertson, R	Gladstone.	Young, Thos. E.	Strathroy.

FOURTEENTH ANNUAL CONVENTION

OF THE

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO.

The Fourteenth Annual Convention of the Dairymen's Association of Western Ontario was opened at 2 p.m., January 21st, 1891, in the Town Hall, Woodstock. The convention was one of the most successful ever held by the Association, the accommodation afforded by the public hall in which the sessions were held being taxed to its utmost capacity after the first afternoon.

FIRST DAY.

Mr. C. E. CHADWICK, the Secretary, said :

GENTLEMEN,—Up to this hour, from some cause or other—I cannot tell what—there is not a single officer of the Association beyond myself who has put in an appearance. But perhaps it would be well to utilise the time, as far as possible, and you might appoint a chairman, and call upon some gentlemen to address the audience upon the subjects to come before the convention. There are parties interested in the trade present who can say something that will be of interest.

Moved by Mr. Schragg, seconded by Mr. Fewster, that Mr. H. S. Lossee take the chair. Carried.

The CHAIRMAN.—It is rather an unusual thing that at this hour of the meeting not a solitary officer of the Association has made his appearance, but as you are here it is probably best to have something done in the way of discussion, and I will call on Mr. Robertson to address the meeting.

Mr. JOHN ROBERTSON.—It certainly is rather an awkward position that we have all been placed in, and you all know the difficulty there is in introducing the dairy subject and in bringing the proper points before the meeting to get a right start. I think you are nearly all cheesemakers here, and if you could give me a few hints of what you would like to have discussed when the meeting is small you might have more freedom and more liberty, and might gain a better interchange of ideas about your own work and what you have found to be difficult points to yourselves than you would have if once the meeting was larger and regular papers were being read.

Mr. SCOTT.—I will ask, in milking in a stable that is not properly ventilated—when there is impure air—when a pail of milk is set aside while other cows are being milked, whether the milk will become tainted while standing in the pail.

Mr. JOHN ROBERTSON.—It will just taint in proportion to the time it stands. It is throwing off steam all the time, but there are elements in the air which it will absorb. For instance, in the foul air of the stable there is a good deal of carbolic acid gas, which is heavier than the ordinary air and keeps falling towards the ground, and the consequence certainly is that a portion of it is bound to fall into the pail ; it may be so small that in a short time you cannot detect it, but it would be present, though in a less degree than if the milk stood for some time.

A TALK WITH CHEESEMAKERS.

Mr. James Butchart, Norwich, read the following paper: In view of the losses that some of us have had on account of bad flavor in cheese during the last two years, I thought I would have a talk with the cheesemakers, and see if we could come at the cause and find a remedy. These losses have not occurred with the poorest makers, but with some of the best and in the oldest factories, which have always been trying to elevate the standard of their cheese, and they are not the result of carelessness on the part of the maker, at least not in every case to my certain knowledge.

When cheesemakers have to make up in money for what cheese lack in flavor to the amount of from $200 to $1,000 during the season, it becomes a serious matter even with those of us who have not yet been thus dealt with. Just here let me say that I believe every cheesemaker, with the responsibility of the factory's make on his hands, is endeavoring to do all that can be done in his circumstances to make the best out of the material he has to work into cheese. So that there is not much danger of our cheesemakers spoiling good material. But the possibility of his making good cheese out of bad material is still less. It is just as impossible for a cheesemaker to make good, wholesome cheese out of bad milk as for a cook to bring a wholesome, delicious article of steak on to the table cut from a putrid carcase.

The cause of bad flavor in cheese in nearly every case begins in the milk before it comes to the factory. There is no article of farm produce so perishable and so critical to handle as milk. It is influenced by the food and water that the cows partake of; by the way in which cows are treated; by the weather and by the air; and this last I think is the most fruitful cause of mischief, but the least attended to.

I will quote from the late Professor L. B. Arnold, one whose memory we all respect, and than whom we have no better authority on milk, to show the influence air has on that article:

> "Milk, it is well known, is an unstable compound. It is constantly undergoing changes, from the time it is formed in the lacteal glands until it is manufactured or consumed. When relieved from the action of absorbents within the udder, and brought into contact with the air, other agencies begin to act upon it, inducing the changes which afterward occur. Unstable as milk appears to be, it does not perish from anything in the nature of its own elements, but is destroyed by influences foreign to its necessary composition.
>
> If milk be drawn from the udder without being exposed to the air, and sealed up tight, it neither sours nor taints, provided it is healthy and sound when drawn, but if exposed to the air it soon sours and decays. Milk absorbs from the atmosphere the seeds of a fungus plant which grows and multiplies and fills it with their presence and produce the souring. There is nothing therefore in the necessary composition of milk which makes it sour or putrify. That it is always matter foreign to itself which destroys it must be evident from the fact that when all foreign agencies within it are killed by scalding, and those outside of it kept away by excluding the air from it, sweet milk will remain unchanged for time indefinite. Milk which has thus been kept sweet for a year or more will sour in two days at 60 degrees by simply letting common air come in contact with it.
>
> The influence of air upon milk is not confined to the absorption of spores which produce acidity. Spores of every kind are taken in as well. Nor does the absorption power of milk end with absorbing living germs. It takes in every odor as freely as infectious germs.
>
> It is a fact which cannot be too strongly impressed upon the minds of every one connected with the care of milk, or the manufacture of milk produce, that milk takes in every odor as well as the seeds of every ferment that blows over its surface. Every odor that comes in contact with milk is grasped and taken in at once, and its grasp is never slackened, once taken in it is there permanently. Milk must be handled and kept in clean and sweet vessels, and must stand in pure fresh air such as would be desirable and healthful for people to breathe."—*American Dairying, pages 167 to 173.*

Now what does all this tell the cheesemaker? It tells him that our system of airing milk is very disastrous in its results. Of late years dipping and airing milk as a means of preparing it for making cheese has been very strongly advocated. As the air is more or less cool than than the milk is when drawn from the udder, passing it through the air time and again was and is resorted to as a means of cooling it. But while this desirable end is accomplished in a small degree, we have lost sight of the fact that while airing it in this way we are inducing it to take in every bad odor and all the living germs with which the air of a cow stable or stable yard is loaded. Milk treated this way at night may appear to be all right in the morning, because of its being reduced to a point of temperature at which these agents of destruction do not work very rapidly. But as soon as brought in contact with the heat they spring into activity, carry on their work of destruction, and can never be got rid of. Any one who knows the nature of milk, can see that milk aired in the atmosphere of a foul barnyard or on a milk stand, at the side of which there is a swill tub, and surrounded by a hog-yard, with all its filthy accompaniments, is not in a condition for making cheese.

Airing milk as a means of preparing it for making cheese has nothing to commend it. The object the patron has in airing his milk is to cool it. This it will not do when the weather is warm ; and the process is so slow and tedious that many give up before it is half accomplished. In my experience during the last twenty years, the best way to keep milk pure and sweet is to cool it with water or ice in a pure atmosphere to a temperature of 60 degrees or under, stirring it occasionally to let out the liberated germs. Milk when cooled is less susceptible to change or to take in spores, germs, or odors, and when at rest cannot take in so many. During the last season I was very much struck with the sweet wholesome character of a mess of the milk which sat all night in a spring of running water. It is well known that in the fall of the year, unless the weather has been dry and the water supply bad, we have no trouble with tainted milk or gassy curds. This we attribute to the weather being cool, and the milk in consequence is in better condition. Also at that time of the year there is very little dipping or airing of the milk going on. But enough has been said on the subject of airing milk, to cause us to investigate the question for ourselves.

There is another matter I would like to bring before you, briefly, and that is the subject of co-operation among us as cheesemakers. At present there is no understanding amongst us as to how we are to deal with the difficulties which from time to time present themselves at our various factories, or how we can best carry out matters of reform. If we had in every county an organization, and had certain rules and regulations whereby we could work in harmony with one another, and would meet in convention once or twice a year for the purpose of giving our experience in our work and talking over matters of reform, and annually send delegates to this convention, through which we might gather information from all parts of the Province it would result in some good. A thorough organization of this kind, it seems to me, would materially help the cheese industry.

The **Chairman.**—I consider this a very valuable paper, and one which this Asociation ought to dwell very largely upon. I am very sorry that there is not a larger attendance. I would almost suggest, when there is a fuller house, to have it read over again. We all know that no cheesemaker can make a good article out of bad milk. There ought to be some uniform way of taking care of this milk. There ought to be some sort of combination between the factories, and, as Mr. Butchart suggested, every factory ought to send delegates to these conventions, and through them they would make rules and regulations to much better advantage than ever has been done, and I would like to see that discussed fully.

Mr. **Hugh Ross** (Embro).—What effect has it on milk to draw it to the factory in the same cans as the whey is taken back in ?

Mr. **Butchart.**—The simple fact of drawing back whey in the milk cans does not have any effect at all ; but other matters come up ; there is the washing of the cans and taking care of them. Those that take back whey like to have things convenient, and generally you find they have a swill barrel right at the milk stand ; and the milk is aired on that stand, and these foul odors and germs are taken in which destroy the milk. I think that we have got into a very bad system of taking the whey back in the milk cans ; but we have got it now, and I suppose will have to make the best of it. You are all aware that in less than two weeks the whey will eat the tin off a can and then it is almost impossible to keep that can clean, and this must have an injurious effect on the cheese. Some are in the habit of sending back whey in the same cans as the milk comes in, and some fight against this. I think that the only remedy open for the cheesemakers now is legislation. We have legislation against sending skim milk to the factories, and against adulterating milk with water, and we might just as well have legislation against sending impure milk in the same cans as the whey is taken back in.

Mr John Robertson.—There is a clause in the Act that refers to milk that is either tainted or impure. Patrons can be hauled up for one as well as the other.

Mr. Butchart.—But they try to humbug you.

Mr. John Robertson.—Well, I think we have got a text from the gentleman who has read this paper. The first paragraph of his paper I entirely agree with ; the second and third paragraphs I do not say I will never agree with, but it is contrary to what we have been taught by the most eminent professors and the most scientific investigators that have been educating us for the past two or three years. The paper says one thing ; our teachers say another thing. There is a common saying comes in oftentimes in a dispute that the happy mean will lie somewhere between the two sides. Now, what Mr. Butchart said about airing milk is simply that it exposes a greater quantity of milk so that it will be more completely brought in contact with the germs and foulness that are in the air round about it. Well, I say yes, but I never heard anybody advocating airing milk in a dirty place, nor near air that was foul or impure. I am not at all, in any way, finding fault with the gentleman's paper, but I simply want to give you different views about the matter, and then you are the jury and I want you to talk the matter over. The first point there is room for disproving, if I got the thought right, is that there is nothing in milk itself that will lead it either to decay or sour. Now, our best teachers have taught us just the very reverse, and as far as my experience goes it has taught me the very reverse. Did you ever know of any animal product, take the whole animal kingdom, that has not the germs of decay within itself? Now, the first lesson that I got was this: I got, well I will call it a "tainted" egg for my breakfast one day and I sat and looked at that and I said, "How in all the world did that egg get that taint?" Because the film that lines the shell is both water-proof and air-proof, and it might have been laid in a dirty nest, but none of the foulness could have entered into the egg. Well, I just came to the conclusion that, like all other animal products, it had the elements of decay within itself. Suppose you put it in a silk handkerchief and keep it in the closest room in the house it will decay and all it requires is to be kept warm. 87 per cent. water, 4 per cent. fat, 8 up to 9 per cent. of other solids, with a very small proportion—something about 9 to 12 of 1 per cent. of mineral matter—that is the composition of an egg. Now, you all know if butter is not pure—if it has not the casein completely separated from butter—it will get rank with the flavor. Why is this? Not because it comes into contact with the air, but because the caseine—the chief ingredient of cheese nitrogen—has the elements of decay in itself, and that butter will decay, I don't care where you put it. Now another thing I know, for it affects this, is that milk will sour under certain conditions, supposing you put it anywhere you like, unless you boil it, and then you change its character. But take milk as it comes from the cow and put it anywhere you like, that milk is going to sour, unless you freeze it, and then you arrest all action of a chemical nature while it is frozen. What makes milk sour? When a boy I used to wonder when I saw grandmother churning, how she got nice, sweet butter out of sour cream. Now, the souring of milk is either quickened or retarded by the temperature the milk is standing in. You keep milk at 70° in the purest air under heaven and it will go sour in spite of everything. What makes it sour? It is just the very same element that makes it sour that makes cider sour ; it is the sugar which is in the milk, which is nearly 4 per cent., and that sugar under the chemical action caused by the heat is gradually changed into acid. Now about the airing of milk ; I thought until I heard this paper that we were making a little progress in knowing how to take care of milk and in knowing how to cure milk, but he rather staggered me, because he took us away back where we were ten years ago. Now, the way to treat milk is just simply this : What do you want it for? If I want milk to keep for two or three days so that I can use it then, I want that milk just as cool as I can get it, but if I want that milk to make cheese tomorrow morning I don't want it cool because I can take more cheese out of it and more profit all around. Is it not a fact in the fall of the year, when the milk stands outside while the air is frosty and cold, that when you get it to the factory you cannot get it at all cured and in proper condition and it has been after dinner time when you could get your vats set? Why was that? Just because your milk was kept far too cold during the night. It had not been properly cured. If you want to make cheese don't keep your milk too cold. When I used to be making cheese every day I tried to have the milk so arranged in the dairy rooms that the temperature would never be below 62°. When the milk stands overnight it is just about right to mix with the nice fresh morning's milk, and just about ripe, ready to set inside of an hour, or sometimes it is ready to set by the time you get it in. Now, one word about the airing of the milk. I will give you just a word or two about my experience, but I do not mean to say I will give you all the reasons why this is so. Now, there would be no no need for airing milk at all if we got the milk always pure from the cow. I have sat on the stool and milked cows myself when I could feel the taint coming up out of the pail I was milking into. It was tainted in the cow's stomach. Now, that is the kind of tainting and injury that causes the gassy curds. It is in the milk from its very formation. Now the airing of milk is simply doing what you can to drive that out. That is the idea about airing the milk and exposing it over a thin sheet or surface in any way so that it will come in contact with the pure air, or the portion of the air that does it good, which is the oxygen which absorbs these taints and carries them off. I will tell you how you will see the principle exactly. You have been in sick rooms ; the people inside would not feel it probably, but the air was so impure that it was almost unbearable, and if you will pull down a window and let a current of air go through the room it will not be long until it is purified. How does it do that ? The window being opened starts a current of air through the room, and the oxygen being strong (and pretty well exhausted in the room) the fresh oxygen just gradually cleanses the air. I will tell you where you have seen it : in a church when it began to get warm and the lights grew dim and someone opened a window and the oxygen supplied what the burning lights wanted. Now the material is different, but the principle of airing milk to purify it is just the very same—exposing it to the oxygen of the air and it absorbs the taints and carries them off, and that is the best thing you can do. Now, it is not so very necessary if the milk is pure when it comes from the cow, but in our climate bad weather, hot weather and sometimes not the best of feed will account for this taint in the milk when it comes from the cow ; and we should purify that which is impure and make the best article we possibly can. I have gone to farm houses that sent milk to the factory, and just as the gentleman who read the paper mentioned, the can was standing exactly beside the pig-sty and the milk came to the factory tainted and I wanted the farmer to shift his milk stand. One and another shifted their cans and that milk came next morning in perfectly good condition. You cheesemakers, I know, have been puzzled with all these things, and we want you to discuss this matter and tell what your experience is, and say whether you are not going to air the milk and go back where you were six or eight years ago, or whether you are going to go ahead and pick up all the crumbs you can.

Mr. BUTCHART.—I do not say I can set anything right, but I can give you common sense ideas for what I do and say. Now, I think I quoted to you very fully from Prof. Arnold on the subject of milk souring. The Professor has been one of our teachers for the last number of years, and we always sat and listened to him with a good deal of interest, and believed a good deal of what he said. It was he whom I quoted as saying there was nothing in milk itself which would destroy. Now, it has been tried time and again ; milk taken from the cow and bottled up will keep almost any length of time, but exposed to the air it will be destroyed in a short time. An egg is not air-tight. If you could keep it perfectly air-tight it would not destroy. So it is with meat, and so it is with the fruit you jar up ; seal it up air-tight and it will keep for years ; take the cover off and it will soon destroy ; showing there is an influence of destruction in the air. It is not the oxygen, and oxygen is but a twentieth part of the atmosphere. The spores that float around in the air are saved from the contact of oxygen by an envelope. If oxygen is going to kill those germs why does it not do so before it gets into the milk ? Simply because they are protected from contact by this liquid envelope that surrounds them. You know in airing milk it takes away the animal odor, the taints that are supposed to be in the cow. It just depends upon the character of these a good deal. Why is the milk tainted as it comes from her ? If she is healthy and has proper ventilation and good food the milk will not be impure. You know that breathing impure air will taint her milk. If you go into a room where there is turpentine it will not be long before your clothing will smell of turpentine. But tainted milk will not be tainted by anything that is purified. You may deodorize it, but the elements of taint are still there, and you cannot remove them by the process of airing at all. Now, in airing the milk you expose it to the air more. That is where I claim we are doing an injury, because in any air these germs of destruction will be found more or less, and the greatest trouble I had last summer was with milk that was aired. I said "Air it 10 or 15 or 20 times, we want to see if there is anything wrong in it," but it did not do any good. When it came on to the milk stand I could not detect anything wrong with it at all, but I happened to find out what mess of milk was doing the mischief, and I made it up alone. The milk came in in the morning nicely. I worked along and thought I must be mistaken just up to the time of dipping, but just as the change came on the taint began to develop itself. Now, we don't want milk cooled down too much, but I would rather you would all cool it down too much than send it in after standing in a temperature of 70° all night. In the paper I read—I advocated cooling down to 60° in the summer. I would rather have it even below that. We can regulate the working up in the factory, but I cannot do anything with this foul milk, and if it once comes from the cow foul you can deodorize it, but unless you make the cheese as hard as boards the taint will develop itself sometime in that cheese. If the milk is unhealthy when it comes from the cow it never should be sent to the cheese factory. People should be careful of that. But it does come to us, and we have to do the best we can with it. My advice to every man who wants to do right is when there is anything wrong with your milk keep it at home. If the cheesemaker says anything about it he is the best friend you have. He tells you because it is his honest conviction that the trouble should be remedied. I do say that I am emphatically opposed to airing milk. I was a little sceptical when the dipping was first commenced, because the milk never came in as good as from those that cooled it down a little, and I have been reading that we were just inducing it to take in these odors from the air.

Mr. Scott.—I have had some experience in airing milk. I sent last spring and got aerators for all my patrons, and all but four used them and they were small ones, and I believe we had the reputation of making better cheese than ever before. I thought myself they were far ahead of anything we had made, and I did not know what to attribute it to but airing all the milk—not in an impure air, of course. I know no other cause. I had the same maker as made for four years, and I must say the cheese was made better to my satisfaction than before. They were purer and sweeter in flavor than any of our former cheese. We went from one patron to another and tried to get them to put their milk through this aerator, and to impress upon them that our success depended upon the quality of the cheese, and that we must have the milk pure.

Mr. John Robertson.—I can quite sympathise with the gentleman who read the paper, and who gives a long quotation from Prof. Arnold's instructions, but if he (Prof. Arnold) had been here to-day his later reading would have led him to put a different construction on this matter than he did in his earlier teachings. He was a progressive man, and was always finding out something new. One night, when addressing us a few years ago, I think in this very hall, he told us that the little fat globules in milk were encased in sacs, and that the milk had to be churned a considerable time to burst these sacs so that we could get the butter. Now, that was believed at the time; but it has since been proven by scientific men, time and again, that the butter fats in the milk are not contained in any sacs, and that the proper system of churning is to get the cream to a proper temperature, and simply strike against it when the portions of butter fats will begin to adhere.

Mr. Scott.—It is not always the milk that is so much at fault. I must say the factory-men are at fault. We do not keep our factories clean enough. I believe, if every factory man would keep his factory clean it would be an example to his patrons, and then he could talk to them better.

The Chairman.—I will give you a little of my experience in cheese-making. I had one patron who has sent milk to me for twenty years, and he has always sent splendid milk. You can tell his milk blindfolded by the smell—it is so pure. His course of taking care of it was to milk in the open air. Everything was pure and sweet all round the premises. Then his milk was cooled and aired. Well now, if one man can send pure milk for twenty years, I cannot see why the rest of them cannot. We get odors from pig-pens, and from this place and that place, and have a bad taint from a bad atmosphere and from bad water. Most farmers milk in the stables, and if you go into their stables you would not wonder that they send bad milk. The stables are filthy, and those cows are inhaling the most unhealthy atmosphere possible. I sold some aerators for Mr. Casswell, and I always told the men I sold, never to air except in a pure atmosphere, because they would do more harm than good.

MEMBERSHIP.

Mr. CASSWELL said the board had decided to do the same as at Listowel, and as had been done for the last two years—make no charge for admission. At the same time, you understand it is necessary according to Act of Parliament to have so many paid members in order to get the grant. We have tickets and badges for all those who want to become members, and the fee will be one dollar, which will entitle each member to receive a copy of the report.

DAIRYING IN WISCONSIN.

Hon. H. C. Adams, of Madison, Wisconsin, on being introduced was received with applause. He said: I supposed that it was to be an informal meeting this afternoon, and did not expect to say a word. I would like to do what Governor Hoard always says he likes to do: "Get the hang of the barn before he begins to tear around in it." (Laughter.) I am exceedingly glad to come to this province. I have wanted to come ever since I have seen Canadian horses, and Canadian sheep, and Canadian men, particularly Prof. Robertson. I have met no man in the United States engaged in the work of agricultural education who has impressed me, or the people of our state, more favorably than Prof. Roberston, of Canada. He came into the work of our Wisconsin institutes entirely unknown and unrecognised by any man except one, and that was Governor Hoard, and he took hold of that work with an enthusiasm, in a practical and theoretical business way, and with a clearness of statement which has made him thousands of admirers in the state from which I come. (Applause.) And so I am glad to come over here and to meet those who are engaged in the same line of business in which I am engaged.

The dairy interest is not bounded within state or national lines, and there is no one flag that covers it. We have to think pretty hard to make money in this business, and if you know any way to do it easier than I can I would like to find it out, and that is the reason I come over here. Then I want to find out how we can stem the competition of fraud that meets us, and I want to find out more about the handling of milk; so I don't come simply as an instructor, but I come over to meet you as a farmer in order to get instruction from you as to how we can get more out of the soil, which you can undoubtedly give me.

Over in Wisconsin we are supposed to be a great dairy state, and we are. We make 45,000,000 lb. of butter a year, and about 50,000,000 lb. of cheese, but we don't do all we ought to do, because out of that 45,000,000 lb. of butter at least 35,000,000—put it a little lower than that, 32,000,000—is second class butter, which sells at 14 cents per lb., and the balance sells at 22 to 25 cents per lb. Now, what is the reason of that? It is not because the men that make the 32,000,000 have not got the capacity to make a better kind of butter. They have got it. Can the man who makes poor butter not make a better article? I tell you he can make a delicate, refined butter, and the trouble with that farmer is that he does not know what kind of a man he is himself—what kind of possibilities he has laid up in himself. It is necessary that we should make him use the information that he already has in order to secure confidence in himself. There is not one man in a hundred but has sense enough, if another man has got him, to take hold of a cow, study her and find out whether she does enough to pay expenses or not. There is no man hardly so common but that he can be taught that kind of a thing. The only thing with the Wisconsin farmer is that he loses $3,000,000 a year, not because taxes grind him, but just because he won't stop to think. He goes along blindly in the old way because it is easier to go along without thinking than to stop and think; and we have been working nineteen years to get these men to thinking and working on the lines of common sense and practical thought. We have accomplished something. Nearly twenty years ago we formed our dairy society. Before we organised the average was about 20 lb. per cow per year. The average product is now about 125 lb. per year, and that is not nearly enough. I have a great many times expressed a wish that lightning would strike 350,000 cows in Wisconsin before night, and the farmers would be better off. (Laughter). But we have had additions to farmers' associations, and good has been accomplished through scattering of thousands of reports. We have what we call "institutes." We go right down to where the farmers live—close to their homes—and have a dairy session and talk about milk and butter and cheese making cows, and men wake up where they have been sleeping all their lives. At first, out of a thousand, 900 of those who went to an agricultural meeting did so to ridicule or to look on with mild interest, but after the first session or two they began to think about these things; and I have seen men come who never made a speech in their lives, who would get so hot that they would be on their feet in less than two hours, and the rest of the meeting you could hardly keep them in their seats. (Laughter.) I remember a story of a man in a State across the boundary. This man's friends wished to induce him to be a candidate for Congress; he said he did not want to act; but they insisted upon it, that the party that he belonged to required his services, and he finally consented. He was elected and re-elected, and when he came up the third time one of his friends who brought him out the first time was a candidate against him, but he failed and this man beat him. The defeated candidate said: "Why, this man makes me think of a calf; you have to pull his head off to get him to suck, and you have to pull his tail off to get him away." (Laughter.) And so these meetings have been educational, and have drawn out the good that lies latent in the farmers, and storekeepers have said to me it is astonishing the change that has taken place in the butter made in the last two years in that state. The farmers are brightening up. I want to say, as I said to a gentleman this morning, that a man who goes through an agricultural college has a hard time of it with those hard-headed farmers. At the same time I do not wish to cast any reflection upon those men in agricultural colleges. They are doing grand, good work—a splendid work. I wish you could see the work of Prof. Henry in the experimental stations. He has made experiments with feeding hogs on milk, and with various kinds of machinery for the extraction of butter-fat, and with cream; and we have established the first dairy school in the United States in connection with that sort of work. We have not been able to make an agricultural course a success, but just as soon as the interest is so extensive in the State as to justify us in doing so, we have pledged ourselves to establish it. There were three young men over there from Canada at our dairy school. Now then, in that dairy school we have something we have wanted for a long time, that is a place where we can send boys, young men, old boys; where we can teach them to make butter according to a definite practice, and teach them how to make cheese. And preliminary to that work we send a man over to Canada to find out what he ought to instruct them in. I have been until the past year, an officer of the Wisconsin State Association for a number of years, and every little while I have got letters asking who were honest and made good cheese, and it is mighty hard to find them. You can get men who are honest, but most of them don't make good cheese—(laughter)—and occasionally you get one who is not so honest as he ought to be. So we are doing that in the line of dairy education.

A number of years ago it was my fortune to be a member of our State legislature, and I had just one ambition, and that was to establish an agricultural school in my State similar to the one you have here. I think the time will come when we will get it. I was beaten then ; political influences came in. I received the support of nine out of fourteen lawyers of the House and the majority of the farmers were against me. It is a singular thing that the profession of farmers, to which I belong, look with more or less suspicion upon all public movements in their interest. That ought not to be so. I want to say to this convention, as I would say to a convention in my own State, that if the farming class obtains that standing in political life, in international matters, which it ought to have, it must simply be because it deserves it. It must not build itself up by tearing down other existing professions, by decrying or pretending more honesty than other professions ; but by making itself more intelligent, cleaning out its own doors, becoming educated men, not simply in the schools, but educated where you live by all the influences about you, by your neighbors, by other classes, by agricultural papers, by agricultural colleges—by all the influences which in this country and my country surround every intelligent man. (Applause.)

MR. BUTCHART'S PAPER AGAIN.

The discussion of Mr. Butchart's paper was then resumed.

Mr. J. S. Pearce.—I have had more or less intercourse with cheese-makers—practical men—through the country, and the prevailing opinion is that airing is the proper way to get the odors out. I may state just one instance in my own experience when I was a cheesemaker myself, eighteen years ago. I then had a patron about three or four miles from the factory, who brought his own milk in every morning. During the five years that he supplied the factory his milk came in in perfect order. Now, what was the reason for that ? That milk was strained into shallow pans, and set away in the milk house (first stirred) on a cold floor. I think this is a pretty good argument in favor of cooling and airing milk.

Mr. Butchart.—I would like to get the voice of the cheesemakers on the subject of co-operation, in the way of organizing county associations. Sometimes when the ' big guns " come among us at a convention like this one we do not say so much as we might do at a country convention. We have difficulties in our business. For instance, I have a man who will not attend to his milk as he ought to ; maybe he skims a little or waters a little ; now, I want to train that man up a little, not that I care for the man himself particularly, but for the sake of the honest men who are suffering. The fear that he will take it somewhere else keeps you from saying anything about his milk. Well, now, if we arrange it amongst ourselves that if a man was a delinquent at one factory, another would have nothing to do with him, we might stop this sort of thing. Then there are a great many other things ; some men will persist in setting milk by hog pens, and if you don't want it some one else will always take it in. What I want is, to get the cheesemakers together to work in harmony with one another to straighten up these things. We might meet and pass rules and regulations ; but unless we have some way of enforcing them, there are some who will resist all the good that has been done.

A Voice.—I tell my patrons at the beginning of the season that if they send their milk the season throught I will consent to charge so much. I make a charge in proportion to the season. If they send for six months I charge so much, and if for three months so much more. I make this proviso also, that I need not take a man's milk if he sends bad milk. They all agree to this.

Mr. Robertson.—I have advocated strongly the last couple of years that if a patron after being instructed as to how to take care of his milk, will not take the advice in a sensible, quiet way, to simply tell him he has to keep the milk at home. Do not be afraid of another factory. I see by *Hoard's Dairymen*, where they caught two or three of these stubborn " chiels," they simply told them they could not take their milk. I had one case of this myself last season. The man was very " honest." " Now," he said, " you are not going to get a sample of my milk." I said : " It is your property and you can do just as you please." He said, " Well, if the company is not pleased to take the milk as I send it I will just keep it at home." There was a meeting of the factory board and they asked, " What will we do ?" I said, " Take him at his word." So the milk wagon would not haul it, and he left it at the factory himself. The milk hauler took it home again ; and he went to another factory next day to see if they would take his milk. The cheesemaker said " No, if you cannot agree with the men you have been dealing with we cannot take your milk." I believe he would have given $50 if the factory had taken it. He had no pans ready, and actually for four or five days he was obliged to feed the milk to the hogs. Then he came to the factory again to see if they would not take his milk, but the directors said " No, we thought you were a man of your word," and I believe it was the very best lesson the neighbourhood ever had.

Mr. SCOTT.—I believe it was a very good stand to take. But many times we find other factories will take the milk. They make bad cheese, perhaps not so good as a factory which refuses such milk—and yet it goes on the market and has its place. I believe the rule would be a very good one not to receive milk at one factory when it was rejected at another on the ground of bad management or adulteration.

Mr. CASSWELL.—I would recommend the cheesemakers if they think well of this matter of county organizations that they prepare a resolution recommending such a thing and then it will be in business like shape ; and I would also ask Mr. Butchart whether he intended to have these meetings for cheesemakers only, or whether they would ask the patrons in the neighborhood of those meetings to attend and give them some points on the keeping of milk ? By doing this, I think you would arrive at two good points.

Mr. BUTCHART.—My idea was that this organisation should ask delegates to be sent to the county convention from the milk meetings, the representation to be, say, two from the patrons and one from the factory, and then send delegates from the county conventions to this convention, and in that way I think we could reach the patrons better than at the present time.

Mr. CASSWELL.—You are aware that one trouble has been to reach the patrons The cheesemakers attend the meetings, but the patron has not received the instruction he ought to receive. But far more could be done to educate them if you would hold county meetings and township meetings through the winter. If you would call out your patrons and tell them what they want, I believe there would be more good done and an end would be reached which has not been served by this convention.

Mr. PEARCE.—I think the time has come when you should organise yourselves in the line of Mr. Butchart's suggestions. One more subject for consideration would be a regulation as to routes, etc. You all know that the big expense in the making of cheese is the drawing of milk and that it is nothing unusual to see two or three waggons going over the same route ; and I think the day has come when that should be done away with. It is money thrown away that does nobody any good. I would also speak of another point, and that is that cheesemakers are " beating " each other down to too low wages. Now, if you had an association of this kind you could fight against that unjust and unnecessary system. I, as a dairy supplier, say that you will have to lay down cast iron rules. I would suggest that a committee be appointed to draft some resolutions on these subjects. The day has come when you should act, and the sooner you take this thing up the better it will be for you all. (Applause).

Mr. P. H. GREEN, (Sheffield).—Some twenty years ago three other gentlemen in our neighborhood and myself established a factory. We ran it for a length of time, but, having other business, unfortunately I dropped out. I have lately taken charge of the business again, and I am here for information. During my short experience there we met with just the difficulties discussed this afternoon. I remember getting hold of one patron whose milk was very poor indeed. Our cheesemaker had very little experience, and we had none, and as a result some sent good milk every time and some sent poor milk, and we had some difficulty in this way. I took the charge of arranging with the patrons in my own hands and when we found any person's milk not quite satisfactory, we quietly drove down to see it, and asked the man to come to the factory and see the milk he sent, compared with what he took from the cows. I never yet got a man to go with us. They were all quite willing to submit. This man said whatever we decided he would stand by. I wrote back that his milk fell short three-eighths of the standard. We gave him his choice of taking a reduction or going before a magistrate. He accepted the latter, and his milk fell short thirty to forty pounds. He said he had dried off two cows ; I said he had dried off the best ones. We had some difficulty with the tainted milk. We tried every plan we could imagine to get over that difficulty. We knew we were turning out an article that was very unsatisfactory. The milk appeared to be all right when it came ; it was put into the vats, and when the souring process was going on, we noticed a musty smell. The cheese was soft and had the same smell. We examined the milk and found it all right. We examined the cans and found they had that musty smell. The lids were worn and patched, and in these lids there were little openings large enough for the milk to get in and ferment, and that just spoiled the milk. As soon as these lids were "kicked" out of the factory we were done with the difficulty. I think Mr. Casswell remembers the difficulty we had. If I mistake not he handled some of the cheese we made at that time. We have one patron who aired and cooled his milk. It was stirred for a length of time and dipped. It was set in shallow pans and set in water. I have had, in the hottest weather, from six to seven cans of this milk kept over from Saturday night to Monday morning, and it came in as sweet as a nut. While I have the floor, I should like to ask another thing, and that is whether there has been a factory inspector appointed for this Association, or whether there have been any steps taken to have an inspector with reference to the management or testing of milk ?

Mr. **Benjamin Hopkins**, Brownsville, the 1st vice-president, entered the convention at this stage, and was called to the chair.

Mr. **Casswell**.—I would just suggest, if it is agreeable to the vice-president's mind that I think it would be well to continue this first session in an informal way mainly for a discussion between the cheesemakers and the people on the floor, and I think more good can be done than by a good number of long papers. You have done a lot of good this afternoon ; and with regard to the motion that I suggested it would be well to leave that until to-morrow.

THE PRESIDENT.

The **Vice-President**.—I am pleased to be here and to meet you to-day. Our esteemed friend, Mr. J. B. Lane, the president, about a year ago went home sick from our Convention at Stratford and since then he has been out but very little. I was in hopes he would be able to be with us to-day, but I hardly think now he will be here. However, we will do the best we can in his absence. There have been no inspectors for the past year and there has been no action taken in that matter so far as the present year is concerned. I suppose the new Board of Directors may recommend it. The year before we rather overstepped the bounds and went considerably in debt, but I suppose we will be able to declare a clean sheet so far as the finances are concerned at this time, and therefore may be in a position to do something in that direction.

Mr. **Chadwick**, the secretary, was called upon to read a letter from the President, which expressed his sincere regrets at being unable, in consequence of prolonged sickness, to attend the convention, and stating that though he despaired of ever being able to take part in the work of the Association again, his heart would be with them to the end in the good cause of developing and improving the dairy interest.

COMMITTEES.

The Vice-President named the Business Committee as follows :—

Business Committee.—J. S. Pearce, London; J. W. Scott, Sparta; Jas. Williams, Culloden; Wm. Fewster, Norwich; Thomas Ballantyne, M.P.P., Stratford; H. S. Lossee, E. Casswell, Ingersoll.

The following committees were elected :—

Committee on Resolutions.—J. M. Butchart, Burgessville; J. L. Farrington, Norwich; Ezra Bates, Mount Elgin.

Committee on Utensils.—E. Hunter, Woodstock; John Fulton, Brownsville; C. Schragg, New Hamburg.

PROF. ROBERTSON ON GENERALITIES.

Prof. Robertson was called upon to give "a general talk." He said: I am quite unused to being called upon to talk in a general way on some general and indefinite subject. I have made it one of my aims always to keep quiet when I had nothing but generalities to speak upon; so this afternoon I am beginning my mission on generalities in dairying.

The first general statement I want to make this afternoon is this, that when a man wants to make a speech, or run a cheese factory, without some definite object in view, he is almost sure to come to grief at some part of his experience. I find men all over Ontario going into cheese making on general principles, and they take milk of all qualities on general principles, to keep in with the people of the neighborhood. Then, I find them doing the work in the most particularly general way, without any particular attention to any particular process, and then we have cheese so comprehensive in every aspect of its nature, as to the shape and as to the size and as to the quality, that you could not possibly name any kind of cheese that would not be embraced in that lot. Now, these generalities do not suit me, so I would like cheesemakers always to have some specific object in view, whether they come to a convention or run a cheese factory; and if a cheesemaker comes here who should now, even at this late hour, make up his mind as to some particular point that he wants to know something about; or if he wants to give information to other cheesemakers about anything he has found out—if he has come with the intention of obtaining any information and of disseminating information—information will be brought to everyone who takes part.

Then I find that we are happy in having with us so many men who have done good service in the past to the dairy interests of this province. Since we have men who have an accurate acquaintance with all your needs I need not take long. My friend, Mr. Ballantyne, is here, and all want to have some of his bright thought, enthusiast as he is. Then we have our friend, the Honorable Mr. Adams, of the state of Wisconsin, the one state in the American Union which is pushing us hardest for the best place as a dairy country on this continent. Now, the Wisconsin people have the very kindliest regard for the people of Ontario, and I believe away down where I keep private opinions, that although they come here it is merely in the excess of their generosity and that they believe we will keep ahead anyway, but they like to stimulate us. So friend Adams, while telling us what they are trying to do in Wisconsin will tell us this one thing at anyrate which the people of Wisconsin have demonstrated to the people of the world, that it is possible to keep cows paying for their board for twelve months in the year, and that may help to lift from us the terrible reproach we lie under to-day of keeping herds of cattle paying seven months' board and living on us the other five months, just because we are fond of doing drudgery and of reproaching the Government instead of minding our own business.

Now, let me say a few things more about this dairy business as to its meaning here in Ontario. First of all we have been doing excellent work in making lots of fine cheese during the summer months, but we ought to do more than that with our herds of cattle. I would like to see the dairying season lengthened at both ends, but I cannot recommend the cheese factory men to make cheese earlier than April as a rule, because the roads are bad and fodder feed does not make the best of milk for cheese making. I cannot recommend cheese factories to lengthen the producing season at the other end, because when the roads get bad the expense of drawing is greater, and the cheese factory buildings are ill adapted for making good cheese in winter. What should we do at both ends to lengthen the incomes from buildings and business? First of all you will find these to be the existing demands; that there is a demand for fresh made butter, and that while stale dairy butter will bring 15 cents a lb. fresh made creamery butter will bring 24 cents. Roads will seldom be bad enough to hinder a man from sending all his cream to one centre, because the creamery wagon can go round twice a week in cold weather, collecting about one-sixth the weight that he would of milk for a factory and the farmer will realise from that, during the winter, nearly as much money as from the cheese factory in summer. In that way I think we ought to lengthen both ends Then, to do that, would involve slight changes. We need to have a few men who will begin having their cows milk the year round—not the same cow milking the year round, though each cow should work the year round. She should make milk ten months and then spend the balance of the year in making a calf. She should not be milked these two months, just because she has maternal functions requiring all her energy. Then we require some cheesemakers who are long-sighted enough and clear-headed enough to know that they can never get $10 a month more until the farmers make larger profits. Then they will urge upon their patrons the advantage and necessity of starting their cows to milk in the fall and all winter, and then from the enlarged profits they will get their own share. We need also to have a few common-sense factory owners who will advocate the desirability and practicability of changing the cheese factories into butter factories during the winter months.

The total cost of changing a well built factory need not exceed $250. Now, the sooner that is commenced the better for the dairy business. The whole change can hardly be made within ten years, but a few factories leading in this good work will soon induce most of the factories to follow their example.

In that way I think this convention could not do better than discuss details of any change in the basis of carrying the business on under that plan. I say that for this reason, that in the mass of general work our conventions now-a-days should be devoting their time far more to discussing the broad principles that we ought to follow and to apply in this business than in discussing the details in making cheese in factories; but in making this new departure we ought to follow even the minute details, so that plans formed and practices established may be undertaken at the beginning on correct principles. And then, to compensate for the leaving out of our dairymen's conventions, of so much discussion on the practical part of handling milk and manufacturing cheese, I would throw out this suggestion—which is not new, but I give it the endorsement of my approval —that the cheesemakers ought to have a cheesemakers' union, where they ought to have things settled which cannot be settled in a mixed meeting of cheesemakers and farmers and salesmen. Cheesemakers have several objects for such an organization. For myself I have very little sympathy with any combination that means coercion, but you can have combination without coercion; a united action, or combination, for expending energy with better results. Now, if cheesemakers had co-operation they would fix a scale like this for remuneration: they would say that a factory, where they make so many tons a year, shall not be taken by any cheesemaker at less than so much per hundred lbs., and then let the person or persons controlling that factory select a man according to the ability, capacity and competence for this work. Now, it is not often a question as to the man who can make the finest goods, but the owners strive to get a man who will cut his wages down, and if this is continued good men will become disgusted with the business and then our trade will go to pieces. Such a union would be useful. Perhaps its greatest usefulness would arise from this particular, that cheesemakers could there discuss the very best ways of testing milk, the very best ways of discerning the proper ripeness of milk for cheese making, and all that part of the business which belongs to a cheesemaker's trade and has no special interest for the people who come to our conventions, they being farmers. Then they could discuss that aspect that has been altogether neglected, that is the equipment of cheesemakers by a more thorough understanding of their business, not merely as a trade, but as leading up to something better, where the cheesemaker would understand the whole theory of cheesee making, and where he would lead in his neighborhood and be not merely a labourer, working for a few dollars more a month than agricultural laborers. I know of nothing after all that would elevate them more as tradesmen than having a sound, well-conducted cheesemaker's union to enable them to solve some of these points.

Speaking of the patrons, Prof. Robertson said : One man sends milk to the factory and complains that the bottom has fallen out of the dairy business, because the cows last year gave him back $22 each, and then he begins to wonder why it is that the cheesebuyers always get the better of the poor farmer, and how it is that the cheesemaker can dress well on Sunday, while he has to wear the same coat for four years ; and he goes on wondering how it is that the Government can pay such nice salaries, and he is all the while "nosing" after those far-off factors whence no help will ever come. First of all he forgets this, that the man who keeps 12 cows and never finds out which is paying and which is not, is tempting the devil—and he does not require much temptation to do wrong as a rule—to keep 12 poor cows living on him all the while. If a man will control that factor as a rule he will find the 12 cows that are paying and turn the others out. By having his eyes all the time intently fixed on something he can control, he will find the cows that milk for a long period.

Then he will have to control the factor of feeding a far less expensive feed. How will he do that? The man who does not grow anything but grass has no right to scorn Providence for putting him in a bad climate, because our country will grow bigger fodder crops than any in the world. Now timothy is a good grass, but it is not half so good as corn grass. Corn grows, you see, to a height of seven feet against timothy's two and a half feet, and it does not exhaust the land nearly so much. On general principles, you see, a man should look after his own business at the home end and he will find his prosperity established

Then a man should control this other factor ; he can make his cows give nearly one-third more milk during the summber by having them stabled and fed all winter. I have been out the last four days since I was at Berlin, and I have seen farmers feeding cows on dry hay—so exceedingly dry that I question if the chemist would find much moisture there—and dry straw (and no roots) and a little dry grain ; and the cows are all dried up, not only in their milk but in their hair, and then all the avenues for the milk are dried up and the cows cannot work next summer ; and so if the farmer would feed some succulent foods, some corn and roots, they would make far more milk and larger profits.

Then, more than that, I find farmers keeping only six cows on 100 acres of land, whereas they ought to keep four times that number. An acre of corn will feed just four cows all winter, but an acre of timothy would not feed one cow all winter, so they have to go into this factor, which is altogether within their own power to regulate as they choose and to apply as they like. They might keep four times as many cows, and then that would mean what?—four times as much manure, and four times as much manure would mean bigger crops. And so by picking out the best cows, and feeding succulent food all summer and succulent food for the cows all winter, the farmer will get more milk and more money, and more manure and better crops. So he can keep more cattle until he will find it is a paying business to run his farm to the full capacity instead of only utilizing one-fifth of the land he owns. It does not pay a man to have a very large factory with a hundred people in his employ working at only one-fifth the capacity of the building and the people ; he cannot make profits that way. His profits come from doing all that his machinery and people are capable of turning out ; and so a hundred acre farm in Ontario ought to maintain 25 cows, and all young cattle ought to be complementary to that.

And so on general principles—and this is the end of this general talk. I would tell you this, the more cows you can pack on 100 acres of land, and the more corn you grow, and the more manure you get, and the more milk, the more money you will make as individuals and the more money you will have as townships and counties, and the more prosperity we will have as a province. So, on general principles, since population anywhere increases the value of property—the larger population of people you get, the more business you will have, and the larger population of good cows you get, the larger the profits you will make.

This is incidental, but sometime during the progress of the convention, I will try to give you either more specific advice or information as to how I think you will be able to carry this winter dairying on in the years to come. Meantime, I am not "giving anything away" when I tell you that in some experimental factories in different centres we hope to try and demonstrate the application of the very principles or practices that I have this afternoon been hinting at for your guidance, and when we have these centres established, and the practicability of these hints has been demonstrated, then I would hope that the whole province would by-and-bye be covered by cheese factories and creameries doing business for twelve months in the year. If we start these this winter, in three years' time we will have ten for one now, and later there can be 100 factories running all winter. I hope to come to Woodstock then and see it. (Applause.)

THE FOREGOING ENDORSED.

Mr. THOMAS BALLANTYNE, M.P.P., followed with an endorsation of Prof. Robertson's suggestions. He said: It has been my experience and preference to do what I could in the way of improving the cheese product and also to assist in developing what Prof. Robertson has hinted at, viz.: combining butter with chesse. The more I think over it the more I am satisfied that successful dairying can only be profitably adoped by educating the cow. For a time I did not see my way to introduce butter in connection with cheese. We had established a very succestful business in cheese. We had been the most successful country on the continent of America. The state of Wisconsin had made a reputation by copying our methods and the state of New York, to some extent, as well as the Old Country, and so far there seemed to be some reason to fear there was a risk in combining butter with cheese dairying. But I am fully satisfied that in order to obtain the best results a percentage of the cows will have to calve in the fall. There are many reasons for this. It is the season when farmers have most time to attend to it; it will result in better feeding and in a better quality of article; it will enable us to make butter when there is a good price for it.

Then there has always been another difficulty in connection with cheese making and I have felt that from the first day I commenced. We have now a great many farmers' institutes doing a noble work in educating and making farmers think, and really the assistance the Government has given to stimulate these has been productive of much good. When cheese factories were first started the question with the farmers was how factories were managed and what they could expect from their cows. The first difficulty suggested was what are we going to do to raise our calves and feed hogs? Winter butter making will largely help this. The farmers have not been raising the character of the cows. It has been a hap-hazard system and they had either to lose the milk or starve the calf, and as a rule they chose the latter. Winter dairying will enable them to select better stock. They can feed their calves in the winter and turn them out in the spring. I was going to say that we have led in dairying; I hope we will continue to lead. My friend, Prof. Robertson, talked about general purpose principles or remarks. Well, he does not generally talk "general purpose," and he did not to-day. I have not much faith in general purpose anything; neither has he. I believe in something definite that we can practice and adopt, and we have been doing so in cheese making, but we must not stop here. We must look forward and see how we can be better educated.

Now, I would say this, that our American neighbors in some respects are very much ahead of us. They are doing work in Wisconsin, from which friend Adams comes, that we are not doing ; we have been doing work that they have not done. We have been more successful ; and I am glad that whatever politicians may do to raise barriers against the interchange of trade there has been the utmost reciprocity of sentiment between the dairymen of the United States and those of Canada, and on behalf of the President of the Western Ontario Dairymen's Association I am glad to welcome Mr. Adams to our midst. When we started we were indebted to our American friends for their assistance. At our first convention we were almost exclusively indebted to them for the information we got. The questions then were, what is a cheese factory and how is it to be managed ? The late X. A. Willard, the late Harvey Farrington and others were the men who assisted to lead us, and we have continued to exchange views. At the present time some of our men—three from my own neighborhood—have gone to Wisconsin dairy school to learn more about their business. This is what I like to see. I do not believe in a man following a trade unless he is bound to excel in it. You have a perishable article to deal with—the most sensitive that I know of—so easily affected in so many ways, and unless a man is an enthusiast and is bound to excel he will never make a successful cheesemaker. And these young men are our best. The very fact that they have gone there, that they may see something, incurring all the expense themselves, is evidence that they are of the right stamp.

Then as to the importance of having a cheesemakers' union. I have talked that for several years. What Prof. Robertson has said is the case. Twenty-five years ago, twenty years ago, or fifteen years ago, who were the young men then coming to learn ? They were the most intelligent of men, the sons of the best farmers, and they were the best young men in the country ; because, I care not what line of life you take, you find the men who are the most successful are the men graduated on the farm. There is a mental fibre about them that you don't find about any other class. The prices paid them were higher than for ordinary farm work, and all were anxious to learn. At first they were willing to work for nothing and pay $100. Now the owners have largely become joint stock companies, the farmers only owning the factories. If this thing had been left to them to start I would not have liked the cheese they would have made ; they have not done much to develop the business ; but they are exceedingly anxious to cut down the prices. However, some of them have paid a little dearly for that, and we find, as a rule this year, that they are getting a little more liberal. But I agree with Prof. Robertson that the cheesemakers should meet and form an organization and adopt some scale of prices. Then you would find the best men would come to the front. We have made an improvement this year in this matter. Maybe it is the result of Prof. Robertson's talking to the owners. At any rate I know three factories where they have raised the prices this year. As to the poorest paid workers, we know how that goes ; they are willing to shirk anything and you know the reasan. Why ? They say "We don't get enough money to make good cheese ; we don't need to do it" This is the worst kind of economy. I do not know that there is much more that I can say now. The meeting is very thin, as is usually the case on the first day, although since we commenced the three day's Convention the thinness of the meeting until the evening of the first day may suggest whether we should have three days of it or not. I shall answer any questions, because I think there is always too little discussion. I have not so much faith in addresses, and have always thought we had too many papers and speakers.

Mr. **Green**—Has the Association taken any steps to secure an inspector or has any application been made to the Government to make provision for one ?

Mr. **Ballantyne**—Do you mean a milk inspector ?

Mr. **Green**—Yes.

Mr. **Ressor**—I see some of the county councils are moving in this matter. I think a short time ago the county council of Middlesex sent a notice to the county council of Wentworth, asking them to assist in having an inspector appointed, and it was unceremoniously set aside.

Mr. **Ballantyne**—My attention was lately called to a resolution which was passed at the June session, and a copy sent to the county councils. Now, in connection with cheese instruction, you are aware that this was combined as far as possible with inspection; but there can be no efficient inspection except by the management of factories. Let us see what this combined instruction and inspection means. Suppose one inspector has 60 or 70 factories, he can only test at one in a day perhaps, and he would be 60 or 70 days in going over the whole of the factories. Such a system of inspection is a mere sham. I have always felt that there can be no reliance placed in it. The men that this Association appoints should be merely for instruction. Some say the inspection might be done better, but it is impossible. You would have to have an army of inspectors. How would you support them? Are you willing to pay for it? Is that the proposal? If you asked the Government to pay for all this they would say it is your business to look after your own interests the same as in the case of any other manufacturers. There are things the state can undertake, but I do not believe that is one of them. I have run a factory from the very inception of the cheese industry, having shipped the first load of cheese on the Grand Trunk Railway, and I have never had a hitch or a misunderstanding with a patron. We are making more cheese to-day than we ever did, and I have no hesitation in examining every man's milk, and I have seen invariably that where factory men did that they had no trouble; but where they did not, trouble has arisen and sometimes resulted in the death of the factory. I recently got a Babcock separator for testing my own milk. There is no use expecting the Government or this Association to do this work. We were the first, so far as I know, to adopt the system of having cheese instructors. It has been productive of immense good, and has been adopted by others, but that is a different thing from having milk inspectors.

Mr. **Schragg**.—What is the price of the Babcock testers?

Mr. **Ballantyne**.—They are all prices. I think the one we have will test thirty samples at once. I think the price was $30 or $40. I did not consider the price. It was a simple question as to whether it was necessary.

A **Voice**.—How about sending out boxes with one scale?

Mr. **Ballantyne**.—The boxes should be all double scaled. Quite a large percentage of western cheese is shipped through; they are not touched from the time they leave the station until they reach their destination at London or Liverpool. Those shipped from New York are nearly all overhauled and put in fresh scale boxes. Others, of course, only get the one, and no cheese should be shipped out at any season of the year without two scales on each end of the boxes. There are plenty of factories that do this; but there are others which do not care a rap about the reputation of the goods. I never did send a cheese without a double scale box since I was told to do it, and since I have had experience in seeing the boxes with two scales at each end.

Mr. **Casswell**. –I have no doubt from what we have seen we are imperilling our reputation by shipping in these single scale boxes.

Mr. **Ballantyne**.—It is not to be considered. In sending out notices to factories we have a printed form to fill up, asking for double scale boards. I often said I would like to see the boxmakers form a union, so as to increase the price for a good box, but the cheesemaker has been left to cry down the boxmaker, so long as he could get the boxes cheap anywhere.

Mr. **Butchart**.—What is the effect if the cheese are not the size of the boxes?

Mr. **Ballantyne**.—They should be the size; but above all things don't let the cheese be higher than the box.

A **Voice**.—Should the lids be nailed?

Mr. **Ballantyne**.—That is a matter of opinion. You may do as the shippers want them.

Mr. **Fewster**.—You said that joint stock companies cried down makers' salaries. Do they do it more than the private factories

Mr. Ballantyne.—We have so few private factories, I cannot answer. I know I have a private factory and I don't do it.

Mr. Fewster.—Of course you are an exception, but do the general run of private factories pay more than joint stock companies?

Mr. Ballantyne.—I believe in our part of the country the joint stock companies pay a little more than the private factories. The trouble is that when they open the tenders they generally take the lowest, but some of the factories this year made a change in that respect. They did not advertise for tenders, but selected their makers and raised the price in every case. I cannot tell you how pleased I was to see that change, because the system of cutting down meant driving all the best makers out of the business.

Mr. Fewster.—When a patron was reported, or fined, perhaps, for sending milk that was watered or skimmed, I have known some joint stock companies which would not take his milk afterwards, while private factories would.

Mr. Ballantyne.—As a business principle we have adopted the plan of sending patrons away who have adulterated their milk. It is a very serious disgrace for a father or his family to be branded as milk skimmers, and the man owning a factory should not be hard, but being satisfied that he has patrons who are guilty of adulterating their milk he should expel them from the factory.

A Voice.—Have you any experience of milk brought to the factory in cans in which whey is taken back?

Mr. Ballantyne.—Many years ago I found the best factories were doing that. I found that it caused a bad flavor in the cheese, and began preaching against it through the press, and in season and out of season, and there is a great improvement in this respect. If you can find anything so sensitive as milk, I would like to know it. Think of the risk you are running of some careless individual neglecting to thöroughly wash and scald his cans. Then another reason against it is that milk hauling costs more. Another reason is that the tinning of the cans gets eaten away very soon with sour whey, and then it is impossible to keep the cans clean, and it costs more for cans. The whey could be sold to companies for feeding hogs. Speaking about the effect of taking the whey back in the milk cans you have all heard of the Elma factory. That neighborhood, where we get as good cheese as we get on this continent, was once making cheese so poor that I did not know what was wrong with them, and I called it the "Elma flavor." I once shipped this cheese in the ball; it cut nicely, but had a nasty, "buggy" flavor. I was in England in the spring and the buyers could hardly sell it; they had to sell it finally at 20 shillings under fine. Looking into the cause I came to the conclusion at last that it was sour whey. The owners called a meeting of patrons and decided not to send back whey in the milk cans, and they have had fine cheese since. I think the thing is all wrong together. The difference in the price that is paid for an extra fine cheese and an ordinary one is so great that it is worth while using every precaution; and it is these very fine factories that have enabled you to get the price you do for your cheese. I say this, that the highest price is paid for poor or secondary goods in this district which is paid on this continent; and why is it? Because this district has got a reputation and buyers send for your cheese; and the reason is on account of a limited number being exceptionally fine.

Mr. Green—Would you put the brand of the factory on the boxes?

Mr. Ballantyne—I would not advocate that. Every one knows that a factory may make a very fine article one month and very poor the next month. There are very few factories you can depend upon for getting the cheese uniformly fine.

A Voice—What is your opinion as to feeding rape?

Mr. Ballantyne—There is no doubt the milk will be affected, but the feeding of rape in the fall depends on the way it is done. I would not allow patrons to feed Swedish turnip tops at any time. We feed on my own farm gray stone turnips after milking; but I cannot imagine, if the cows are allowed to feed on rape, but that the milk will taste and make a very inferior cheese.

Mr. CASSWELL—Rape is ten times worse than turnips or turnip tops.

Mr. BALLANTYNE—I believe in feeding a little turnips once in a while. It will ncrease the milk, and if fed just after milking, the milk has very little of the flavor.

A VOICE.—Which takes the market best, cheese with a little color or highly colored ?

Mr. BALLANTYNE.—It is a matter of opinion. To-day colored is preferred ; but there are districts where they prefer the white. The consumption of the white has increased. The time was when they were not consumed. London, for instance, did not take a white cheese. The working classes there, and people in the north of England and in some districts of Scotland use the colored ; and you have other districts where they prefer the white. If white is in demand they rush into the colored, and if colored is in demand they rush into the white.

A VOICE.—We would like to have your views as to airing or cooling milk, or both.

Mr. BALLANTYNE.—There is no question they are both right ; but see that the utensils are clean. People are apt to trust too much to a little water which is inconsequential. I will tell you what my experience has been last year. We had a very cool year, and with a view to assisting our patrons I gave them each an aerator. We never took more milk to make a pound of cheese than we did last year, and I do not know ; but I think the people trusted to putting the milk through the aerators once. In cold weather it is more important to aerate the milk in order to prevent the waste of fat, and it is the extra fat that brings the extra price for cheese ; and I am afraid there is a great deal of the loss caused by not stirring enough to make the separation perfect.

Mr. CASSWELL.—Some 16 or 17 years ago I bought a factory's cheese near St. George. I found a bad smell of turnips in the factory. The owners said it could not be, as there were no turnips in at that time. We " pulled " the cheese and knew at once it was rape. I said I could not take the chesse. They found one of the patrons had been feeding rape regularly to his cows The result was that they sold for several cents below the price that was offered first. It is bad to skim a little, it is bad to skim much, and there should be no skimming at all, and there should be no rape fed at all.

The convention adjourned till 7.30 p.m.

EVENING SESSION.

The convention resumed at 7.30. Mr. THOMAS BALLANTYNE, M.P.P., was the first speaker, his subject being :

EXPERIMENTAL DAIRY SCHOOLS.

He said : Owing to circumstances over which I have no control I will not be able to remain during the whole meetings of the convention. This I very much regret. You all know my interest, and if I have felt it more my duty, in connection with one thing and another, it is to aid to the fullest of my ability everything in connection with the dairy business.

It may be as well, in order to understand the question, to take a brief retrospect of the dairying business in this country. Those of you who are old enough, remember that some thirty-five years ago an immense number of cows were bought here and shipped to New York State, their milk to be manufactured into cheese and the surplus product to be shipped to England ; and while we were asking ourselves here could we not do the same, the system was introduced into this country, and principally, I may say, owing to the late Harvey Farrington, of Norwich, who is justly entitled to the title, " Pioneer Dairyman of Canada." Remembering what he did, I say it would be difficult to find an individual in all respects so well qualified to do what was then required. When he started, he had visitors from all parts of the province to learn what a cheese factory was. The result was that cheese factories were introduced into this country and dairying spread very rapidly. Had it not been for his efforts in connection with the cheese factory system the growth and development of the industry must have been very slow, but as it was it spread very rapidly and we became soon large exporters of cheese, It is true, at first our goods were occupying a very inferior position in the English market, selling lower than American cheese which was then made mostly in New York State, in Oneida and Herkimer counties, and it was thought there was something peculiarly adapted there for the manufacture of a fine article. They had very fine grass land and the country was generally well watered, and it was not thought we would become formidable competitors in the markets of the world. This was the position at that time.

By-and-bye we began to improve and there were a small number of factories producing, I think I can say, a very fine article. At the Centennial Exhibition we were successful in carrying off the highest honors, and that was important in giving us a standing in the markets of the world. However, it was seen that something must be done to get a larger percentage of fine cheese, and the question was in what way we could improve the whole product. The result was the Western Dairymen's Association of Ontario was the first to suggest the idea of employing instructors as a means of communicating information and showing makers the correct process of regulating the proper proportion of salt, the development of acids and everything in connection with the manufacture. The result was we had a very decided improvement. Cheese made in eastern Ontario at this time was selling at one to one and a-half cents per lb. less than western cheese, but they followed our example, the result being that their article brought equal prices with ours the past season. They were perhaps better situated than us; they had been dairying previous to the introduction of cheese factories, they understood the care of stock, they had been making a better quality of butter, ours was about as bad as could be. That was our position then.

What is our position to-day as a result of our care? Our cheese sells higher as compared with New York State and the Ingersoll district—meaning by that all west of Toronto—has best reputation and commands highest price of any American cheese on the English market. Looking, before I came to-day, at the *Grocer*, published in London, England, which contains a record and the transactions and the advertisements of all the leading men in the cheese trade, I notice American cheese is quoted about four shillings under best Canadian cheese.

So far we have done very well, but I still believe we can make a very great improvement. I remember a few year ago when Scotch cheddar cheese, made in the dairy districts of Scotland, where they are doing nothing else and where they are keeping pure Ayrshire stock, occupied a very inferior position in the markets of the world. In England our cheese would sell higher than the finest Scotch cheddars. But they have been taking a leaf out of our book. A gentlemen interested in the business, Mr. Wallace, happened to be on a visit to this country and spent a week with me discussing every matter in connection with the factory system. I suggested the formation of a dairy association, and said by that means the practices and principles of cheese-making could be clearly explained, because every day convinces me that while our meetings have been of immense good, yet it is actual demonstration that can do the most good, and when you consider how delicate a thing cheese-making is and how much difference there is in the value of the goods on account of quality, you must fully recognise the importance of every particular being fully attended to. I was present at the formation of the Scotch Dairy Association in Ayr. They decided to employ instructors, and instead of employing one of their own number, they applied to me to recommend one from this country as cheese instructor to do similar work there as is done here. They have now gone a step further and have established dairy schools in connection with their work of instruction. Now, if that is necessary there I think it is more necessary here.

But let us look at the position of affairs where these schools are in existence. I found last year on a visit to Scotland that the finest Canadian cheddars were selling at 43 to 44 shillings, while their finest cheddars were selling at 60 shillings. That was a great difference, and it is a difference which concerns the farmers, because the cost of manufacturing good cheese is just the same as of manufacturing poor cheese. The demand for fine cheese is always good, and looking at the *Grocer* of to-day I find that fine is scarce, and common plentiful, with a dull sale. Now, I have felt that the advantage of having dairy schools as compared with the employment of instructors is very great indeed. Let us look at some of these advantages. We employ a number of instructors ; they can only visit one factory a day ; each instructor has, say, 60 factories. Of coure we have a number of factories making very fine cheese ; but there are a number making a very poor article indeed, and we must not think that we have reached that stage at which we can do without instruction. If we had dairy schools the makers could go to these. There could be half a dozen such schools. The makers could all make arrangements by which they could get away for a day to visit the schools ; and if we could improve the product--if we could raise the quality of the whole product—(because we must not think they are all as fine as they should be, and the result is that the poor ones drug the market) it would be a great step forward.

I visited these dairy schools in the old country. Before the introduction of these methods to improve the qualities I was struck with the small quantity of really perfect goods, and I now saw the immense advantages there of these schools. They were all private dairies, they were in the hands of intelligent men, but they had no means of informing themselves. The maker was comparing himself by himself, or herself by herself. The result of these dairy schools is that a large percentage of cheese are almost as fine as can be made. There is an immense difference, and it is not that there is such a difference in the value of the article, bucause we know it is not really worth 3c. per lb. more as a nutritious article of food, but the number of people who are willing to pay for a first-class article is getting larger every day.

Well, sir, we go further. I have told you that I spent several days in visiting those dairies, one day with Mr. Drummond, and several days with a gentleman who had very much to do with the establishment of the Association. I was amazed at the immense improvement in the quality of their goods. We found a small percentage that were not really fine, we found a large percentage that were clean, that were sweet, that were nutty and stylish, and this is largely the result of the means that has been used there to improve them.

There is a great show held in connection with what is called the dairy fair, at London, and out of 90 exhibitors 78 were from the district where these dairy instructors had been employed. Some dealers did not believe that such fine cheese could be made in Ayrshire as they made ; but they took all the prizes but one, and that was a third class prize. They did more, they took the sweepstakes prize for the best of the ordinary. There were 78 exhibitors from Scotch dairy districts out of 104, an evidence of the interest and emulation these schools have excited.

Later we find the great cheese fair at Kilmarnoch takes place, undoubtedly the largest cheese fair in the world, and where they take the greatest possible interest in the subject ; and the result was there we found the difference between Canadian and old English cheddar systems of making, the Canadian carrying off the day in the most decided manner, these instructors being all Canadians, whom I had the honor of selecting ; and here it is (reading from the *North British Agriculturist* of October 29th) :

> "The great feature of the Kilmarnock cheese show last week was the extraordinary success achieved by Mr. Robt. Wallace of Auchenbrain, who has now the championship of the show for the second time in succession. This year Mr. Wallace has not only won the championship but also carrying off over £80 of prize money. I find these cheese are all made strictly according to the Canadian system as taught by Mr. Drummond, and his cheese which won the sweepstake was declared by the judges to be as nearly perfect as could be."

All the other Scotch papers in reporting the show testified in a similar manner to the superiority of the Canadian system. Now, I had visited that gentleman's place and found he was an enthusiast. There is no man who will ever excel in the manufacturing of dairy products unless he is an enthusiast. You are handling the most delicate article in the world, and the slightest departure affects the quality. This instruction may not enable us to make a prize cheese exactly every time, but it will show us the system we are generally pursuing, viz: the time to add the rennet, the quantity of salt to use and all those things that go to make a really perfect article.

Now, sir, I felt we had to go a little further. Our instructors have done good, our associations have done good; but I felt we ought to go farther; that we ought to do better if we had two or three dairy schools. I don't mean to make cheesemakers there, but those who are already engaged in the business could go and see the later improvements and be stimulated to still further efforts. I have often found cheesemakers doing poorly; it was difficult to find them going to another cheese factory to get lessons; they thought they would lose prestige by doing so. We have even had to have recourse to drastic measures and tell them to go to some other cheese factory to learn. I have not seen them do so without being improved, if at all capable of improvement. I remember one case in which the cheesemaker had got off the track—and, mind you, the most skilful and intelligent men are very often apt to do so, and the result was he had a lot of inferior goods which were unsaleable. I happened to ship them. I said go to a certain factory and see how they do there; he went, and I may say he has not made an inferior cheese since. Well, coming nearer home, during the past season we found several cheese factories not one hundred miles from Woodstock which were making a large quantity and not a good product. They went to a neighboring factory to spend a day and compare notes, and I don't know but the pupils obtained more than the teachers for the remainder of the year, and demanded the highest prices.

I think further, sir, we have reached a time when more attention must be paid to testing milk. We must pay for milk according to results. I know I was one, when this was first suggested, who thought it an impossibility; but our best dairymen, our most intelligent dairymen, are now beginning to discuss it. In connection with the meeting of my own patrons of Black Creek factory, a motion was passed unanimously, in favor of its adoption as soon as practicable. A dairy school would be in touch with all the improvements we are making from time to time. Our own men would go there, and there is no doubt others. Here is a machine called the Babcock testing machine. I think that tests 24 samples in a very few minutes, showing the exact butter fat contained in the milk. Now, at our dairy schools the makers would learn the use of new appliances. Our past experience should make us realise that we need these schools, and as I mentioned this afternoon four of our young men have gone all the way to Wisconsin to take advantage of the instruction offered in dairying schools there. Now, we want to do this work at home.

We go further. If the best results are to be obtained, as Prof. Robertson said this afternoon, we must make butter in winter, and cheese in summer, and the dairy school would be to teach butter making in winter and cheese in summer. You will never get the best results unless that is done. The winter is not the time for making cheese, but it is the time for making butter; and, even at present there is an unlimited demand in Canada for pure, fresh butter. I hope before long that the supply will be in excess of the demand and then we can ship to England—because the duty would prevent, even if prices favored us, from shipping to the centres of the United States. There can be no doubt about the advantage of such a change. Having the cows calve in the spring and giving milk for six or seven months is not beginning to do all that can be done. Having tried it on a small scale myself, and making between 60 and 70 lb. of butter per week, the result is we have no difficulty in getting 25c to-day in Toronto. Now, winter dairying will stimulate the farmers to feed better; and they can get better manure. A difficulty about the time the factory system commenced was crowding the calf for milk. Now, there is nothing to prevent the calves coming in the fall and after a week or two you can give them skimmed milk.

There are some reasons, which, to my mind, render it important that we should make this further departure. I know the difficulty there is about carrying on these things. I know the great demands upon a voluntary association such as this, but I think this is one of those things where the State could assist.

The proposal has this further advantage: Let the results be carefully tested and published, and, while I am not sanguine enough to think that every farmer would at once follow this example, they would in a very short time follow it. If deep setting were adopted (I am setting in the highest cans) the cream could be hauled once a week and each individual paid according to the value of his cream, because there might be a difference in the quality according to the different modes of separating the cream from the milk.

Now, I wanted to bring this matter up; it was impressed upon me so strongly this year in Scotland, and the whole of the papers, the *Grocer*, the *North British Agriculturist* and the rest of them give very full reports, and all giving credit for the great improved ment to the introduction of the Canadian system and schools for the proper teaching and selling for a difference of 3c per lb. over best Canadian. I will say, there was a richness about their cheese that is not in our cheese, and the consumer, for that nice, nutty flavor, is willing to pay the difference. I do not think it is from the richness of the milk, and I have thought that a great deal of this want of richness in our cheese came from not properly stirring the cream in the milk and preventing a separation which is never afterwards thoroughly incorporated. Do not take any risk in this matter. We have been insisting upon cheesemakers trying to educate the farmers to stir their milk. The last year was as favorable a season as we could have, for many reasons, yet we find it has taken a large quantity of milk to make a pound of cheese. I think, on account of the low temperature, there has been a separation without stirring. In order to emphasise the importance of airing the milk and to keep up the enthusiasm amongst our patrons, I gave each of them an aerator last summer. Now, what I am going to state may not be anything against the aerators, but I think the patrons trusted too much to them. I felt confident that we should see that they do not allow the cream an opportunity to rise in cool weather. We want to see to it personally. Make it part of the business; not going to an individual suspecting that he is doing what is wrong, but making it part of the business to see that he is taking care of the milk.

Now, these are some reasons why I think dairy schools, or experimental stations, are wanted. My idea is to put one of them in the west and one in the east. I do not advocate this because I want one at Stratford; I don't know any place more suitable than Woodstock. I would like something more than that; I would like a dairy farm in connection with the school. I would make that experimental; I would keep dairying stock there exclusively, having the calves come in the fall. I think we could make one-third more from this than by having the cows calve in the spring in the ordinary way. In my own dairy we weigh the milk of each cow every day, every ounce, so we know what every cow is doing, which is the only way to fully realise the difference between a good and bad cow. I had a cow that gave 11,000 lb. milk in 10 months. I am satisfied if we had kept on the old way she would never have done that. There is no question about winter dairying paying if you can get 25c per lb. for your butter, and no doubt you can get that so long as you manufacture a superior article. I make my own butter on the farm. I am not advocating that, but the cream can be hauled to a factory in connection with the cheese factory at a very small cost. By getting a very large quantity of butter, from what might be small quantity of cream from each patron, you can get the very highest price. As I said, I would have a farm in connection with the dairy school, keeping, say 30 cows, and have the information as to what was being done there disseminated all through the country. A private individual may make an experiment and the result may reach your next neighbor, but it does not reach the same number as where an experiment is carried on under the State, when the result is disseminated through the length and breadth of the country. Now, I hope you will have a full discussion on the subject, and I am willing to answer any questions. I was very much pleased this afternoon at the turn the meeting took. It has always been one of my regrets that the time was so much taken up with papers and not so much with discussion. (Applause.)

Mr. Butchart.—Have those cheese that took the prizes been made principally in private dairies?

Mr. Ballantyne.—All in private dairies. There are no factories in Scotland.

Mr. Butchart.—Would that account for their milk being richer? There is sometimes skimming here.

Mr. Ballantyne.—I am not prepared to admit that. Don't let the world believe it. It is the meanest kind of stealing. I know of no kind of dishonesty so disgraceful as the skimming of milk. The person who does it would not dare to do it in the presence of his hired man, and it must be with the knowledge of his own family. I admit there are isolated cases, one or two in each factory, but that is about the extent of it, and I would favor, as soon as possible, wherever proved, expelling them from the factory, and that is the best way to cure that. Mr. Butchart suggested that as a reason for the difference in richness; I don't believe that. I believe there are a number of factories where there is not much of that and where the character of the people is a sufficient guarantee against tampering with the milk. I cannot but think that Mr. Butchart has run a factory long enough to know that patrons cannot skim their milk without exposing themselves to great risk.

Mr. Butchart.—Allow me an explanation. There are a great many who do not think it is at all wrong to take a teacupful of cream off to use in their tea. Men have come to me, apparently as honest as anyone, and told me they do it and they will do it whether you are there or I am there. A hundred men in one vicinity would be as honest as in another. A teacupful, you see, taken off by each of one hundred patrons would mean a great deal to the richness of the cheese made in that day and certainly a great deal to the average made in a season.

Mr. Ballantyne.—I am very sorry to hear it. I understood a few in one of my factories took off cream for coffee and we stopped it very promptly. There may be some localities where it is done, and if so that accounts for their inferior products and for their taking a low price. If factory managers knew of it and allowed it there was certainly something dishonest, for if each man was allowed to be the judge of his own cupful one man would take off twice or three times as much as another.

Mr. Lossee.—Do you think the effect of the cheese being made under the farmers' own supervision in Scotland would be to produce a better quality of milk and make a finer cheese? I think so.

Mr. Ballantyne.—I will not pretend to say that there should not be a delicacy of flavor that ours has not; but I will say this, that the patrons can attend to their own milk so that it will arrive at the factory in perfect condition. First, they should see that the utensils are perfectly clean, scalding them every day. We have found that every pound of poor cheese diminishes the value of the goods. If a man takes home a pound of poor cheese it may last him two months, whereas a pound of good cheese would last him only a day perhaps, and it is because we have recognised this from the first that we have all been willing to exchange our opinions. I would say that I remember when watching the milk very closely in the factory, making the cheese myself and saving a sample of every man's milk, that a sample of milk which came the farthest was invariably good; no sourness and no taint about it. What one can do all can do; but if it is a mere question of getting milk enough, looking after it no farther, taking no means to see that you are really getting it right, then of course the maker is struggling with floating curds and everything else during the whole season.

A Voice.—I have seen butter fat seven or eight inches deep around the whey vats, and I would like to see it in the cheese.

Mr. Ballantyne.—It never became properly assimilated. Those of you who are using machinery if you cut the curd into square pieces find no waste from the manipulating of the curd, and those factories which have been taking the largest quantities of milk to make a pound of cheese have been most successful. I think it is chiefly owing to the nice milk, and corroborative of that I remember when we used to make twice a day and the majority then had agitators and the cream was never allowed to rest; but the moment we commenced to haul the milk once a day it took more milk to make a pound of cheese. The present arrangement is best if the farmers will only take care of their milk.

Mr. Lossee.—We want to know what effect these dairy schools would have on the product?

Mr. Butchart.—Mr. Ballantyne alludes to the richness of their cheese in Scotland, and he claims that they owe a good deal of this to the training they got in the experimental schools.

Mr. Ballantyne.—No, not the richness. Before these schools were started a small percentage of the cheese was fine, but a great deal of it was defectively made and got out of condition and in London they did not want it at all and could not sell it. I mentioned the character of the goods, but I did not say the richness. I referred to the extra qualities, the proper percentage of moisture, the solidity, the nice character, neither too much salt nor too little, and that the processes by which all this was accomplished showed that the pupils had been able to follow their lessons.

A Voice.—Supposing there was a dairy school. In one section the cows are salted regularly and in another section they are not salted. Would that make any difference?

Mr. Ballantyne.—The very greatest difference.

The same Voice.—I don't see then that the dairy schools would make any difference.

Mr. Ballantyne.—In disseminating knowledge, that is all.

Mr. Robertson.—I will read an extract from a letter bearing on the subject, from one of the most largely interested cheesemakers in Scotland; one who has spent a great deal of his time in assisting in the advancement of the dairy interest there. I wrote him some time ago as to what his opinion was as to how they had succeeded in improving the quality of their cheese. You know their surroundings, their cattle, their pasture, their manner of feeding. There is very little change in regard to these, and the most of the change that has taken place must have been simply in the manipulation of the milk. I asked in my letter if he could give me just what he thought had been most conducive to the great improvement, and he replied as follows:

> "Regarding your enquiry as to dairy schools, with us *versus* instruction, I am of opinion that the latter is by far the cheapest and attains the greatest benefit, as with a few instructors going around the whole of the matters can be got at with a very moderate outlay of cash, and by this means we have made great progress with our two instructors."

Then he refers to the schools:

> "However, if the means are available, a dairy school is of great benefit to those that are situated near the school, and more specially to young people who mean to make dairying their business. We find it rather expensive, however, and but for a government grant of £200, and something like £500 yearly for subscriptions from the landed proprietors, we could not carry it on, as the fees obtainable would not avail to pay the costs."

If Mr. Ballantyne and some of our other dairy friends can persuade our Government to give us a dairy school, by all means let them know that we want to have it.

Mr. Ballantyne.—I want to emphasise one thing: There was a large percentage of cheese that we knew were wrong last spring and they turned out worse than we expected, and the result was very much lower prices. If we had a dairy school the cheesemakers could go there, and I have often seen a case where a cheesemaker was sent to a good factory to learn, and there was a difference in his work from the day he came back. Then there are many things that could be carried on in such a school. It would require a little money, but it does not require so very much. Mr. Robertson has referred to a grant in the old country. It is a remarkable fact that the only grant given by the Imperial Government to aid agriculture is a grant of £5,000 divided among the different dairy schools in Great Britain.

Mr. G. R. Pattullo.—Would it not be a good thing if this Association were to pass a resolution which might strengthen the hands of Mr. Ballantyne and other men in the legislature toward getting a grant. It seems to me that there can be no doubt if we are to have the character of our cheese raised to the same high standing as the old country cheese, this is an absolute necessity. Now, the only way in which expression can be given to this idea is to pass a resolution which will strengthen the hands of Mr. Ballantyne and other gentlemen interested in the dairy business. I would suggest that the matter be referred to the committee on resolutions.

Mr. T. J. Dillon seconded this motion which was carried.

THE FARMER AS A BUSINESS MAN.

Hon. H. C. Adams was again introduced and gave an address on the above subject. He said: Mr. President and gentlemen of the Western Dairymen's Asssociation: It seems almost too bad to snatch this convention from the subject of cheese-making to consider some other topic, for I see you are business men and many of you patrons of cheese factories, and that is a subject of vital interest to you. If I could have managed to satisfy myself I should have had Prof. Robertson to speak in my place. But I want to say, in reference to this subject, as I said this afternoon, that we have a dairy school in our State. We have there a State University, and connected with it a State Agricultural College which is practically a part of that university. We have also an experimental station under direction and control of Prof. Henry. There is placed under that now a dairy school. It is supported by an appropriation of $25,000 a year. We have located upon the farm a building which is known as the Dairy House, and the pupils are taken right into that house and shown the various processes in the manufacture of butter and cheese. We have not only a professor of dairying, but an accomplished agricultural chemist, and in addition, a practical man from the state of Illinois who has been known as the president of the dairy association of that state. We are already crowded for room to carry on this work and have struck out in no line that gives more hope than this one. I believe, here in Canada, where you are acknowledged as masters in the production of cheese, there is still room for dairy schools to do work.

It seems to me that if farmers are going to be business men, which I am going to talk about, they will have to stand up for themselves. It is an old saying that "Any fool can be a farmer." Any fool can be a lawyer, and some of them are lawyers; but no fool can be a good lawyer, and no fool can be a good farmer in these modern days. There may have been a time when a fool could be a farmer, but I tell you it hustles a smart man pretty lively now. (Laughter.) But there is a certain class of men who do get along in an average way on the farm. I come from the state of Wisconsin, and I see there farmers of every community, and every class, and every political belief, and every degree of mental ability, and I have talked and talked about this business of farming. Some of them say "We are going to the dogs; other classes are jumping on us, the railroads are squeezing the life out of us, there is something wrong about the government, and it seems to us the Almighty is against us." Right beside them we find men who get along well; even when butter averaged only 21 cents per pound, when we got 7 cents a pound for cheese, when oats sold—hundreds of bushels—for 25 cents, we found men making money and making it because they are business men. They apply to their business the same principles which the merchant applies to his business, and which the banker applies to his business; and if these men, have at least got credit for being business men they believe they have gained something.

Before I go any further let me say I like to see a man on a farm who has got some enthusiasm for his business, who respects it, who is ambitious to get on, who is always a child, who is always willing to learn even if his hair is white and there are wrinkles in his face. (Applause). The successful men go at their business and study it, and the first thing they do is to look at themselves and say, "I wonder what I can do best on the farm; what did the Almighty make me to do on the farm?" Maybe the man is best fitted for raising sheep, or it may be for raising cows, or to raise strippers, and like enough the Lord made him to make saurkraut, and like enough when he knows what he is made for he enters on that line. What is the use of a cowman trying to raise a steer, or a horseman trying to raise chickens, or a man like myself trying to raise beans? We can't do it. It is hard enough to succeed when a man follows the current of his ambitions. There are number of boys that are pegging right along after their fathers, trying to pick out the same tracks, and they don't get a cent richer and they don't stop to think what they are doing at all. Some of the boys think it would be sacrilege to get out of the ways of their fathers. I respect the boys who respect their fathers. It is the curse of our nations, and perhaps of every nation, that there is not enough respect for age and years in this modern age; but no man has any business to do just what his father did. If he doesn't do better he is not half as good as hi father, because we know, standing to-day as we do in the centre of modern knowledge that our fathers have all along been coming up from darkness into light, and if a boy is as good as his father is he will do better, because he has his father's experience to start with. It is your business, young men, to stand upon the shoulders of your fathers, and, if you would be loyal to them, avoid their errors, emulate their virtues and go on from the point where they have left you. (Applause). I recollect when a boy on the farm we had a cow which gave two pounds of butter a week, and we wouldn't sell that cow because father had her for four or five years. I confess I had not wisdom enough to get rid of a poor cow until I got married and started out in business for myself, and had to get a living and to find out something about this cow business. Now, I want a man to go right on and think for himself; to act on the best judgment he has, and add to that the best judgment of every man from whom he can absorb wisdom and knowledge and facts.

There is one thing I notice a great many of our farmers do not do, and for that reason they are not business men. They do not keep a cash account. Now, that is a simple thing, but I find when I talk to an audience about it that not one in fifty of them do it. Like enough at the end of the year the farmer knows he is behind, but he don't know what particular account has cost him more than it has given him in return. If he keeps an account he can see like a banker where his money comes from and where it goes to. I find lots of farmers who go about doing this or that, but mighty little they know about it. I have known a farmer who thought clover grew seeds at both ends. (Laughter). I have known a farmer who did not keep a cash account, who, when two or three men were wanted to contribute toward getting some one to give an address at an agricultural meeting in his neighborhood, would say that he could not afford it, and then he would go down to the village and buy ten glasses of beer. (Laughter). Keeping a cash account makes a man acquainted with himself and enables him to do business like a business man.

Now, there is another thing; the farmer who is going to be a business man and a benefit to his class should conduct his business in such a way that the boys will take to it and like it. I don't believe in compelling a boy to be a farmer if he doesn't want to be one. I think if the Almighty has made a man that he considers he ought to be a lawyer let him go and be a lawyer, for heaven's sake; if he is so constituted that he wants to pull teeth, let him go and do it; but out of this class the farmers of this country want a greater portion. We don't want the young agricultural class continually drained off. We don't want the prize boys to go into commerce, trade and professions. We want some of them with us to help to build up this profession to which we belong. One way to keep the boy on the farm may be to drive a 20-inch spike through him into an oak tree, but it is not the only way. I am inclined to think one of the surest ways is to put a chain of gold around him and hold him there, because farming is a profitable business. We all like money, we like the comforts of life; and a boy is going into that line of business where he can get them, and he can get them on the farm. Not long ago I went between two towns in my state, a distance of nine miles about, and the friend who was with me, who knew every farmer on the road, said there were thirty men between these two places worth $20,000 apiece. See that the boy's life is not ground out of him. We can do something in that direction, and when the farmer runs business on business-like methods the boy sees logic in that fact. We can not only do that much but we can have some sympathy with the boy. I recollect I used to live on a farm and worked as much and as hard as any boy, and when I used to see other boys trotting off with their skates it positively made me think that farming was not worth a cent. At the same time we must not forget—and I don't forget, because I have been through all the hard experiences of farm life—that when a man is poor the business of farming is necessarily a pretty hard one; but a man of ordinary sense is just as certain to win in the battle of life upon the farm as he is to live, unless a special misfortune comes to him, and you cannot say that of any other line of business hardly. In the mercantile and manufacturing professions of the nation to-day I believe it is true that 90 per cent. of the men in business fail.

There is one trouble about farming, I will admit. We are isolated, and out of that come some of our weak points. We are apt to get down into ruts, and you will find graduates of colleges and female seminaries going out on to farms and shrinking under the grinding necessities of their life or what they conceive to be the grinding necessities of their life. But this is wrong and it is not absolutely necessary, and the farmer who is a business man will get out of those ruts so far as he can and get into meetings of this kind where he can touch elbows and think with men who think as he thinks and live as he lives. In Wisconsin we are helping somewhat in these things by means of farmers' institutes, and in winter we get together and many of the farmers contribute something of their experience; perhaps telling something about a steer, or a cow, or a pig, or something about clover, and all go away richer and none of them go away poorer.

There is another thing that farmers ought to do to dignify and ennoble their profession, and that is be a little more cheerful. Over in Wisconsin we farmers are called a lot of Quakers. They say we are eternally protesting against everything, and it is a mere habit, to a greater or less extent, and we ought to look at life with a little more cheerfulness, with a little more of the spirit of that little girl living in a hovel in one of our northern states. She was living under the care of her grandmother. She was sick, and there came a change when the night had half closed. They were poor and there was barely enough to eat in the house. To keep the child from freezing her grandmother tucked all the clothing around her she could find, and still she was cold. Finally the old lady went and got some boards and laid them over her, and then the child waked up and said, "Grandmother, what do you suppose the poor children are doing to-night who haven't any boards to cover them?" And it seems to me the farmers, out of the fact that they have got the protection of a splendid government; out of the fact that there is a stability about their business which there is about no other, out of the fact that they come in contact with nature as those engaged in no other business do, out of the fact that there is in the air a sinewy and moral fibre which makes honorable, moral men, should lead them to cultivate their business.

Then, the farmer who is a business man ought to be a politician, not to get office but to have things in the state as they ought to be done. I like to see a farmer take an interest in the politics of his country. I like to see a farmer who goes to a political meeting and stands up in his manhood and says: "I am part of this government, upon me rests some of the responsibilities for the excellence and efficiency and patriotic administration of our laws." That is the kind of a farmer I want to see, and we are getting more of them in our country, and no doubt you are getting more of them in this one. We have agricultural demagogues, but the friends of the farmer—the real friends—are the men who say to him, "Stand up in the exercise of your rights, independently and vigorously, and vote your way through, not simply for the interest of your class, but for the interests of all classes. I have no respect for that farmer who thinks some other business is more honorable than his own. It is not. Any business is honorable which has in it room for honest thought. The man who drives shoe pegs and the man who practises law, and the man engaged in any business, who is sincere and pays attention to the work that God has given him to do, stand precisely on the same plane, and I like to see the farmers take an interest in the management of political movements, and not because they are farmers, but simply because when that sentiment is spread broadcast throughout this land and throughout the land from which I come then we shall have less evils in government and less evils in society. (Applause).

VALUE OF EXPERIMENTAL STATIONS.

Prof. Robertson, being again called upon, said: Mr. President and gentlemen,—I have been asked to follow Mr. Ballantyne and speak upon the value of experimental dairy stations. It is hard to hold the attention of an audience upon such a prosaic subject after being thrilled with the eloquence and good sense of our American cousin who has come over here to exchange dairy thought with us. It was my good fortune some years ago to go to Wisconsin and there meet for the first time the Hon. Mr. Adams, who was then a power in his own state; not to move political parties, but to lift the sluggish farmer from indifference about the concern of his own business, to become a wide-awake citizen; and when I went back in the following year I could see, during my brief stay, a wonderful change for the better in the farmers' institutes of Wisconsin. The personality and efforts of Mr. Adams helped very much in accomplishing that. The farmers' institutes of the continent have become powerful agencies for the improvement of agriculture.

I am asked to speak to-night on the value of experimental stations to cheesemakers and cheese-making, and since the bulk of those present are cheesemakers I will intersperse my remarks with statements concerning experiments made last year and referred to by my friend Mr. Ballantyne.

The value of all experimental work is two-fold. Every act of investigation has in itself a double power of service. It is competent to discover, and every man who goes through the world with his eyes open knows how much need he has for additional knowledge from discovery. But the main value of experiment is not discovery, because most men are so far behind the leaders in every kind of experiment or investigation that they are not putting into practice one-half the truths that have been recognised. The other value is that of tuition, so that by repeated demonstration even those who are apathetic about their own business might be taught to put in force the truths taught by an experimental station.

Then, let me say this also, that the station should be a centre whence reliable and authoritative instruction in cheese-making should go out. Cheese buyers go around the country, many of them benevolent men, but more of them more anxious to make one-eighth of a cent a pound on every box they buy, and that is understood. Some of the best men know right well how to help a cheese-maker, and some others, with as good intentions, know only how to leave behind them instructions that may have most disastrous effects. All teaching is not reliable, and therefore we need a dairy station to which to refer for sound instruction.

Then these centres should be open to all comers. They should be open to the patron to learn how milk for cheese-making can be tested, and to learn how the Babcock separator distinctly discovers the exact per cent. of fat in milk. But the station should also be open to cheese factory salesmen, who by going to it once in a while and seeing how neat and fine and uniform in appearance were all the goods on the shelves, would go back wondering in the presence of a cheesemaker how they had got all the cheese of such uniform character. If you can stimulate a man into wondering why he is not doing good work, you do a good deal. So by way of illustration, when a buyer goes into a factory and finds the goods all uniform, in shape and appearance, he is prepossessed in their favour; but if they are not uniform in shape and appearance, he shall look out for the defects and will not have to look very long.

For the practical service of the cheesemakers who were not present at the last convention, I would like to make a few statements regarding experiments made in 1889 with a view to discovering the solutions of unsettled problems. My friend, Mr. Ballantyne, at the convention in London, proposed that experimental stations should be established. A resolution was passed at his suggestion, asking a small grant for experimental work and this work was carried on for a short time.

The investigation embraced "the effect of the use of certain quantities of rennet extracts upon a given quantity of milk and also the effect on the cheese when made." A vat was divided into three compartments, and the milk in each was not merely from the same patrons, but was precisely of the same quality, having been previously mixed. In the first, we used 9 ounces of rennet to 1,000 lb. of milk; in the second, 6 ounces to 1,000 lb., and in the third, 3 ounces. Now if any of you want to get the full details of these experiments you can get them in the last report of the Ontario Agricultural College, and I dare say you could get still a sufficient number of the special reports on these experiments. This was the first discovery: in the same quantity and the same quality of milk in three compartments, we put different rates of rennet extract, and there was no difference observed in the process of curing. Then the curing of cheese in regard to its rapidity does not depend upon the amount of rennet extract used. Hence the extract is not the curing agent, and its use is simply, so far as I can discover, to coagulate the casein of the milk and enable it to hold the fat so that there will afterwards be one-third fat and one-third casein and one-third water in the cheese. Then the coagulation of fodder milk is more difficult than the coagulation of summer milk ; hence you should use more rennet extract when fodder prevails than when grass prevails. But a point not yet understood is this, that the coagulation of milk in October is also very difficult, and a larger quantity of rennet extract should be used in October than is usually put in. When cheesemakers have used rather more extract and rather more salt the October goods will be quite superior, and when cured at a proper temperature they will compare favorably with September's.

Then another fact noticed was this, that there is always a heavier body when a large quantity of extract is used with a sufficiently large quantity of salt to ensure the keeping qualities. The rennet enables the curd to retain more moisture, and the more moisture there is retained in cheese the more rapid is the fermentation that produces curing. Now, if you use an extra quantity of rennet without a sufficiently large quantity of salt, the cheese will not be preserved so well, but if sufficient salt is used, you can get a cheese that will keep. So another thing is, that we can make a heavy-bodied cheese by the use of more rennet and more salt than is usually applied.

Then this also is to be said, that the longest-lived cheese are those made by the use of the least quantity of rennet extract, all other things being equal, because the less rennet you use the less likelihood there is of retaining moisture, and the less moisture there is retained the less fear there is of fermentation. All fermentations act more quickly in the presence of moisture than in the presence of comparatively dry substances. Salt is opposed to fermentation. Therefore, you put in a large quantity of salt and you have a cheese with a rich body and still a good keeping flavor.

Then milk that is over-ripe or acidy requires the use of a larger quantity of rennet extract to enable the coagulation by rennet to precede the coagulation by sourness or acidity. We have learned a few things you see : To use more rennet in the spring and fall ; to use with it more salt ; and to make coagulation perfect in this way.

In case of over-ripe milk another experiment was made with the use of salt. I won't weary you with the details. In one lot we put 2½ lb. of salt per 1,000 lb. of milk ; in another 2¾ lb. per 1,000 lb., and in another we put 3 lb. of salt per 1,000 lb. of milk. A large number of cheese were made, and were judged both by myself at stated intervals, and also by Messrs. Robert Ballantyne and A. F. McLaren, and here are the conclusions of the examinations. There were altogether eighteen lots. Now, these were judged at intervals from the end of August to the end of January. The first lot in which we used 3 lb. of salt, stood 1st fifteen times, 2nd once, 3rd once, and equal once. The cheese salted with 2¾ lb. stood 1st once, 2nd fourteen times, 3rd twice, and equal once. That salted with 2½ lb. stood 1st once, 2nd only three times, 3rd thirteen times, and equal once. You can see that the large preponderance was in favor of the cheese salted at the rate of 3 lb. per 1,000 of milk.

Now, the highest rate of salting gave the heaviest body. The larger the quantity of salt the drier is the curd, and the longer the time required for curing ; but in the making of cheese from spring milk I would never exceed 2¼ lb. of salt per 1,000 lb. of milk.

Mr. BALLANTYNE.—Don't you think a little less would be better ?

Prof. ROBERTSON.—I say I would never exceed it. Even use down to 1¾ lb. Now, I need not give you a long statement of the third investigation. It was in the treatment of curd after the removal of whey. *One* lot I had stirred on a rack, with a strainer cloth, and it was then allowed to pack, and was turned over and turned and packed seven or eight layers deep. The *second* lot was stirred and turned and packed two layers deep. The *third* was stirred on the rack and stirred all the while afterwards. The experiments were made with the same rennet, under the same conditions, and everything else was alike. I was not the judge, but had the judging performed by experts at the convention. There were five lots of nine cheese each. Lots 1 were matted, packed and piled ; lots 2 were matted only ; lots 3 were stirred and not matted.

Mr. BALLANTYNE.—Never matted at all

Prof. Robertson.—Never matted at all. Lots 1, matted, packed and piled, stood 1st twelve times, 2nd once, 3rd five times, equal five times. Lots 2, matted only, stood 1st twice, second fifteen times, 3rd once, equal five times. Lots 3, stirred all the while, were 1st four times, 2nd four times, 3rd ten times, equal five times. Now, you see, no one of these treatments seems to be essential; and this is the average required to make a pound of cheese in August, weighed on the 3rd of January: by the matting and piling, 10.53 lb.; by the matting only, 10.60 lb.; by the stirring without matting, 10.74 lb. Those were the averages from the weights taken on the 3rd of January.

Let me quote a point here from the same report. That is this: Some cheesemakers are reluctant to believe that cheese shrink when put in boxes before being shipped when left a short time in storage. The average shrinkage from August 30th to October 18th was from 5 to 5.8 per cent. Then the average shrinkage by weight from the 18th October to January 3rd was 2.2 per cent., or nearly 2¼ per cent., making altogether nearly 8 per cent., or 8 lb. to the 100 lb. from the time the cheese were made until the 3rd of January. It sometimes does not pay to hold cheese past the time when they are best for selling to get ¼ cent more per lb. if you lose 2 to 3 lb. in the hundred. Then tests were made in setting some milk at 84°, 90° and 96° Fahr., and no appreciable difference was found.

I have gone over that perhaps as fully as I very well could do to-night under the circumstances, and in the time at my disposal, but you can see that there is still a great field open to those who will conduct dairy experiments, and the more authoritative that work is, the more serviceable it will be to every cheesemaker throughout the land.

I might cite a great many instances showing the necessity for dairy instruction; I will give you one instance to show the crying need of them. It has been claimed that milk for cheese making should be paid for according to the solids. The only test, so far as its service is concerned, is a test to discover the per cent. of fat. Now, that will determine precisely the value of milk for butter making, but will it determine the value for cheese making? It may or it may not, because so far as I know, no one has tried to find out. I propose in such experimental dairy stations as may be established that the exact quality of the milk supplied there be tried every day, and that all 3½ per cent. milk should go to one vat. The cheese from that milk should be kept apart and compared; and all 4 per cent. and 4½ per cent. milk should go to the other vats, and then with one season's investigations we would have some authority to say 3½ per cent. milk is worth so much relatively to 4 per cent. milk, and 4 per cent. milk is worth so much relatively to 4½ per cent. milk. Then if a factory is willing to receive any class of milk and pay for it according to its quality let it do so, and every man would feel that he was getting full value for what he was furnishing. As soon as you can make the patron believe that, you have put within him a strong element of attachment to his factory, which at present is absent.

Then as to the causes of cheese going off flavor, such stations could have cheese put to one side and keep it for one, two or three years. It would pay the country to have the best bacteriologist try to discover the causes and perhaps suggest a remedy. It would pay to have half a million spent on that if favorable results could be obtained, so that cheese could be kept without these continual risks.

Besides that, there could be done something to encourage farmers to go into the dairy business, realising that they could carry it on profitably all the year around, and if the first year a loss occurred in the running expenses of the factory, then the people could afford a loss on a few school houses for the benefit of the whole of the people of the Dominion. Assuredly I believe that these experimental stations would be very advantageous, and that the dairymen of this country need not do without them any longer if they make the Government know that they want them very badly.

Let me say in conclusion, that these stations would have a very wholesome influence upon the minds generally of the dairyman, as making him such a man, who, having a knowledge concerning the intricacies of his business would begin to esteem his calling at its true worth, and who would esteem it all the more highly because he knew he was putting his own thought into his work through his own hands. A man who blindly plans can never have manly respect for his vocation. When a man has his foot planted firmly upon his knowledge he begins to realise that he is doing a man's work, and putting his knowledge into practical exercise is the pre-requisite of a man that distinguishes him above all other creatures for these reasons: first, because of material advantage, then because of social gain and respect from all other classes. It seems to me the establishment of experimental dairy stations should commend itself to every man who wishes the country to be in a prosperous state financially, that they may be in a better state in their citizenship. (Applause.)

A Voice.—Have you used salt in over ripe milk before you added the rennet?

Prof. Robertson.—I have used that but I have always found that a larger quantity of milk was required to make a pound of cheese, though I have not made accurate tests.

Mr. Butchart.—There is one point I would like to draw attention to. It is said that the matting process is nowhere. That is contrary to the way we have been educated in the years that are passed; but I also found out in my own experience that the stirring of the curd has been of no benefit at all. I never made as poor cheese as by the stirring process. I did it because it was advocated so much, but the cheese did not give me satisfaction and I quit the stirring process. I made others and gave the curd the double matting, and they gave me altogether better satisfaction. I have found out that the curd that has been treated to excessive stirring did not have that nice flavor that the other cheese had. Well, now, I have been revolving in my own mind how that could be accounted for. I have accounted for it myself. I may not be right. There are certain flavors that taste nice in butter and cheese. We like to get them. Any flavor that smells will escape. The smell from a bottle of the esence of turpentine will soon fill this room if the cork is taken out. These flavors are not like the spores or germs which cause putrefication, and they do not breed, but are becoming less and less as they are exposed to the air. I contend that by stirring we have been taking these flavors away, and also inducing the curd to take in other odors.

Mr. Ballantyne.—The time was, fifteen years ago, when the curd was stirred perpetually, but I am not aware that any makers have been making on that principle since. I remember that I never saw finer cheese than came from one or two factories before there was any matting. Of course it is impossible to keep the cheese without some matting, unless you stir the curd and get it to dry. But I think Prof. Robertson's experiments are of the greatest value in connection with rennet. It was taken for granted that rennet is the active agent in curing cheese, and to him is due the credit of proving that it is not. It enabled makers to know that they could use rennet more freely, which was necessary, in the spring of the year than later on. As he has remarked, when milk is over-ripe you can use more rennet, without any danger or risk, and get a very good cheese. Then the fall cheese was not fine, it was uneven and limp. It used to be that buyers would not buy fall cheese; now the ripening of the milk more has something to do also, and as he has said, you get as good cheese in the fall as at any season of the year. These are experiments of the greatest possible value to cheesemakers, and let them see that they act upon them.

Mr. John Robertson, (London.)—There is another point I want to mention since you are discussing the action of rennet on cheese. I went to talk to several makers last summer. During the summer they were troubled with the cheese—not being able to get a good, solid, smooth rind on them, although they had been careful. I asked them how much rennet they were using and they said 2½ ounces of extract per 1,000 lb. of milk. Now, I said, in the summer time that is too little. I am not prepared to say that using an ounce more will prevent your trouble, but it will in a great measure, and I could scarcely persuade them to use an ounce more rennet. I was in a factory this summer where they had a quantity of milk which was a little too ripe. The maker said: "What will we do with this?" I said: "It will scarcely stand heating; it is too ripe; you give it double the quantity of rennet and I will take the risk." We put in double the quantity, and the curd was ready for cutting in less than ten minutes, and when the cheese was cut up it had a splendid rind upon it. Now, I was going to tell you that not one of those five or six men that were troubled with cracking cheese and who used an ounce more rennet were troubled in that way afterwards.

A VOICE.—Which lot of milk made the best average?

Prof. ROBERTSON.—The average was precisely the same—10.88—in all cases of the tests with rennet. Let me say this, that in those cases it was a test of rennet against rennet. In the matter of stirring: the curd with the most rennet was doubtless stirred rather longer than the others, because it is essential in cheese-making that the curd and the whey be separated in a large measure before the matting. I am on the programme for a talk on the dairy farming of Canada to-morrow, and if any cheesemakers want an answer to any questions I would be glad to answer them at the opening of the convention in the morning. I would like to say that in other provinces besides Ontario experimental stations are badly needed. I will give you one illustration: In the Island of Prince Edward—the gem of the Maritime Provinces, and perhaps the gem, in quiet beauty, of all the provinces—cheese-making was started a few years ago. The man that originated the business lacked something, and after a time the factories all closed up. Perhaps the island is best adapted on the whole for making the best cheese in the Dominion and there is a prospect of the industry being re-ëstablished. Meanwhile I have committed myself to finding places in the best cheese factories in Ontario for eight or ten young men from Prince Edward who want to come and learn the practical part of cheese-making for a whole season that they may go back and correct wherein their fathers erred. I would like to get the names of a few of those who want to have a young man to learn and who have well-built and well-equipped factories, and who—rating yourselves with all due modesty—consider themselves first-class cheesemakers.

The Convention adjourned till 10 o'clock to-morrow morning.

SECOND DAY.

The Convention resumed at 10 o'clock.

NOMINATING COMMITTEE.

Mr. FULTON.—Last year and the year before a little difficulty was experienced in the working of the Nominating Committee on this point, that a number of the committee—I think four—were on the Directorate Board, and even the directors themselves felt that it was an awkward position to be in to have a fraction of the committee nominating and supporting themselves as directors for the coming year. It has been suggested that in making your nominating committee this year none of the directors be appointed on it.

The PRESIDENT.—I think there is no director, after what has been said, would sit on that committee. Therefore, in making nominations you will please leave the directors out.

The Nominating Committee was then elected as follows: Messrs. John Fulton, Brownsville; John Geary, London; James James, Nilestown; Robert Facey, Harrietsville; Robert Ballantyne, Stratford; Harry White, Pine River; J. W. Scott, Sparta.

Letters were read from Mr. W. W. Huston, Principal of Woodstock College, inviting the members to visit that institution; from Hon. John Carling, Minister of Agriculture, Ottawa, acknowledging receipt of invitation to be present at the Convention; and from Hon. John Dryden, the Ontario Minister of Agriculture, to the same effect, and stating that he would make it a point to be present during some of the sessions.

QUESTION AND ANSWER.

Mr. SCOTT.—I would just like Prof. Robertson to be a little more explicit than he was last night, in regard to the use of rennet early in the spring and late in the fall?

Prof. ROBERTSON.—A very few words will suffice to make clear what I said. The use of rennet is for the purpose of coagulating the casein in the milk, and in the spring it is difficult of coagulation. Therefore, every cheesemaker, to avoid all leakages, should use enough rennet to coagulate the milk in 15 to 16 minutes, fit for cutting. Then, to prevent having cheese which is very dry or stiff, a cheesemaker should not use more than $2\frac{1}{4}$ lb. of salt per 1,000 lb. of milk. When the cows are in the stable, fed on dry fodder, I think he should not use more than $1\frac{3}{4}$ lb.

Mr. Schragg.—In any kind of milk ?

Prof. Robertson.—I don't think it would make any difference, only this, that in very soft curds some of the salt may be washed off with the whey. So a cheesemaker's training should guide him for adding just so much more salt if some of it has been drawn off by the extra whey. In the fall the coagulation is not quite so thorough. Therefore in October I would use enough rennet to coagulate the milk in not more than 35 minutes fit for cutting, and then I would see that the curd was heated to 100 degrees and kept at that temperature. Then I would add 3 to 3¼ lb of salt per 1,000 lb of milk.

A Voice.—Would you advise us to set our milk at 88° or at 90° ? Which do you think would be best ?

Prof. Robertson.—Except in the case of milk that is over-ripe or over-acid it makes no difference. I spoke of experiments last night of setting at three temperatures. In these the milk was set at 84°, 90° and 96° and we found no difference. I believe the setting temperature makes no material difference, except that acidy milk can be coagulated always more perfectly at a high temperature than at a low one

A Voice.—How would you handle milk that has a strong flavor of turnips so as to produce a fine-flavored cheese ? (Laughter).

Prof. Robertson.—I suppose the man who wrote this thought it would be an impossibility to give him an answer equal to the occasion. I would trade that milk off for milk from cows that got no turnips. (Laughter.)

DEHORNING CATTLE.

Hon. Mr. Adams, in reply to a question as to the effect of dehorning cattle, said: Of course there is not time to go into that at length, but during the last two years we have tried dehorning cows in Wisconsin. A great many who handle cattle have been dehorning. It is quite true that sufficient time has not elapsed to determine the effects of that process upon dairy cattle, but we do know this, that the experience of stock farmers has been in favor of this process. I recollect meeting a Scotch farmer in Dane County who had about 300 dehorned, and he said he would not have the horns put back for $500. Of course there are certain advantages which are obvious, and one is that you can turn steers together in a shed without any danger of them injuring each other, and you can get a larger number of them together in a given space, and you can handle them like a flock of sheep. Not only this, they don't fatten so well with the horns on, and when they are dehorned it don't require quite so much labor to feed them. When we come to the details of the process it is urged that it is a very cruel practice, but most of our men who have practiced it don't think it so. It is a very brief operation and the pain does not begin to be so great as during that certain other operation in the animal's life. Men who complain about it and who belong to humane societies have tried to stop the practice and have carried the matter to the courts and been beaten every time. I am a dairyman ; I raise dairy cows and could dehorn them and would do so, but for one reason, and that is I like to see the horns. In my experience I have found them to be a device of cruelty. In a single year I think that one cow suffers more from the horns of other cows, than a whole herd would from the operation of dehorning. Then, as I said, the operation is a very brief one. A man will go into a herd of 80 and dehorn the whole lot in three hours. Governor Hoard maintains that if practiced the ultimate effect would be towards the beef side ; that it will cause a cow to lay on flesh faster ; that it will turn the process of making milk, into the process of making meat. Whether or not it takes anything from the vitality of a sire is something I don't know, but I have met men who have been dehorning seven or eight years and they say the sires maintain their vigor.

Mr. Schragg.—What time would be the best to dehorn ?

Hon. Mr. **Adams**.—It is a disputed point to some extent. It is claimed by men who have studied this question that it is not advisable to take the horns off calves for this reason, that when they mature they never know they had them and acquire a habit of bunting, which is just about as bad as hooking, but when taken off after they have got into the habit of using them, it is said to make them extremely tame and mild and tractable. I want to say they are using some sort of chemical now in our state which is put on young calves and prevents the growth of horns entirely, and I understand that the application of that mixture is not attended with much pain.

A **Voice**.—I want to ask if the male and female were dehorned would there be any horns on the offspring ? (Laughter.)

Hon. Mr. **Adams**.—That is a fair question, too. I think that probably there would for a time, but I do think, that if you kept dehorning these cattle for generations, finally the horns would disappear altogether. We know this, in ages past, when cattle were wild they had very large, strong horns. They had to fight to live and those with the longest horns and largest muscles survived in the struggle for existence, and when men got hold of them and they were taken care of and did not have to fight for a living, then the horns began to grow smaller until we have that highest product of cow science, the Jersey. The horn has disappeared because there has been no use for it, and when you go further and cut off what little is left you will find that by-and-bye you will wipe it out of existence entirely.

DAIRY FARMING IN CANADA.

Prof. **Robertson**, was again introduced, and said : I am to speak upon dairy farming in Canada. Ours is a big country and I have a large subject, with a short time to discuss it. I had either the good fortune or the misfortune to be called upon unexpectedly yesterday afternoon to say something to those then assembled in the Town Hall. I said some things which I had meant to save up until this session ; but with my usual Scotch generosity I gave the best of them away then.

However, this morning I would like to bring some of these before you again, and dress them in a new garb, so that those who were not there may have the benefit of them, and that they may appear to some who were there in a new light.

I am glad to see here this morning cheesemakers, and I do not think cheesemakers should be satisfied if most of the time is given to the details of cheesemaking practices. A man who contents himself with knowing only the nature of the one circle in which he operates, will never have a widely extended influence in the community where he resides. So, I think cheesemakers should come to these conventions in order to be informed of the broader aspects of the questions that concern them, so that they may go back and stimulate the farmers in such a way that they may become the leaders in agricultural thought, and not merely the makers of the products.

Then, I am glad to have patrons here, because, when the farmers who furnish milk to cheese factories hear the discussions, they begin to discover that a cheesemaker follows a task of unusual difficulty, and then they will be willing to make allowances for some of his mistakes. Because while proper enough and necessary that the cheesemaker should be required to make good all loss on inferior cheese—(just as an obligation upon him to do his best)—I still think that no cheesemaker is able to make equally fine cheese every day of the year from the milk he receives every day of the year ; and when they recognise that cheesemaker's sometimes do their best and fail to make the best cheese, because of different influences, then the farmers will not bind cheesemakers to pay for all inferior cheese ; but only for such as result from carelessness or incompetency on the part of the cheesemaker himself.

And then, the cheese buyers who are here can be both useful to the convention and the industry, and receive some points themselves by coming to such gatherings as this. The men who sell the cheese do not know what the foreign markets require, and we expect the buyers to give them information. Mr. Ballantyne asked me to impress the fact that the English buyers and consumers will have solid cheese, and let one look ever so symmetrical outside, if it be porous inside, the price will be cut down from one to two cents a pound.

I will have something to say, perhaps by-and-bye, to each of those classes of dairymen before me ; but, I will speak meanwhile of the broad lines of policy in dairy farming, for the benefit of those who may study this report during the coming summer, and shape their course according to its recommendations, as well as for the pleasure of those of you who pack the hall so densely to-day.

First of all, I want to say in this connection that the very name " dairyman " and the name " dairying " have created in the minds of most farmers an erroneous conception as to the meaning of the calling that they themselves follow. If you speak of a dairyman, at once some one says, that is some one who milks cows and handles cows, and knows nothing else except about cows. Dairying has a wider signification than that and should comprise within its range everything from the tilling of the soil, up to the marketing of the finished concentrated products. As soon as dairymen begin to inform themselves in all the aspects of this wide-reaching calling which they follow, they will be able to do their work far better.

Now, the object of dairying is like the object of all farming—to find food for the people and preserve fertility in the soil, and give employment to a large number of people. Just as dairymen recognise the force and place of each of these three uses of their business will they be successful—food, fertility and employment.

When a dairyman does not know that his efforts are directed to making food, he will keep cows that give 3,000 pounds of milk a year, because he thinks it does not pay to get more. He will say, " I want to get the price of cheese up to 20 cents per pound," instead, of saying, " I want to get 6,000 pounds of milk per cow at no more cost than the 3,000 used to entail." Now, the tendency of all effort is to cheapen the cost of production, and the man who furnishes from his own barn the largest supply of food for the people, has the greatest chance for getting a big profit ; because it is better to have cheese selling at 8 cents per pound, from a 6,000 pound cow, than to have a 3,000 pound cow and obtain 12 cents a pound. Other dairymen are learning to produce cheaper, and the force of keen competition will leave profits only to those who produce cheapest. So every cheesemaker should try and have his factory a centre of agricultural education, in a district whence the people will send out the largest supply of food per acre, from their neighborhood ; and in doing that they will be able to maintain the fertility of their soil.

Now, dairy farming must be the main industry in Ontario, and I think will be the main industry of the whole Dominion in coming years, because no sort of agriculture will elevate the people and enable them to carry on the work in this threefold way quite so successfully.

Then under this first head let me say a few things. The demand of consumers to-day around the whole world is for foods of a more concentrated quality and value. A long while ago people lived mainly on bulky and cheap food, but now-a-days the residents of the great centres of population insist upon having concentrated foods of fine quality. They eat more meat and butter and refined articles of diet. That means, you see, that the dairyman has an advantage, because he sells refined articles carrying the largest value per pound at their weight. A man sells a ton of cheese at 8 cents per pound, that is $160 ; and a man sells a ton of hay at $8. He has sold a ton of material from his place in both cases, and in one case he has been able to load on his ton of material, labor and skill only bringing $8. In the other case he loaded on his ton of material, labor and skill carrying back $160. Now, if a man gets $160 against $8, how much more chance there is for that man to have a profit. I will run the risk any time of getting a margin of profit out of a large sum like $160, rather than if I had only a small sum like $8 a ton.

Then, in the question of fertility, it becomes even more essential that the farmers of this country should protect their soil. The land which we farm once had in itself a good deal more strength to sustain plants than it has now. Most farms have become weak ; that is their productive potency has been exhausted, and they are like a man who has been passing through a long stage of wasting illness ; when he recovers he is weak.

He may measure as much in girth, but he is weak and cannot do much until he regains his strength. When people persist in cropping land year after year the fields measure no less than they would measure before, but the energy, the vim, the power is gone. They need a course of treatment to bring back the strength to the soil. Now, dairy farming will do that. For myself I have no sympathy with the people who are all the while running our country down, and proclaming that this land of ours is not the equal in any sense of any land on this continent. (Applause.) I have small sympathy with the man who says that the fertile fields of Oxford and adjacent counties will not grow as large crops as has been grown anywhere in America. The soil will grow larger crops than elsewhere, when the soil gets a fair chance, but we should not sell large quantities of grain from our farms, because it takes out of the soil its strength without putting it back again. I think Prof. Roberts made a calculation like this that with fifty years farming by a rotation of crops a farmer would take more out of his land per acre of the substances that go to furnish plant food than he could buy in any part of the world to-day for $100. We did grow, a great many years ago, large crops when grain farming, when we were taking out of the soil fertility which had been accumulating for centuries and ages and cycles before us. But a large bank account will not stand repeated checkings by a profligate liver who does not make any deposits.

Then, in the matter of employment, I find that wherever men follow dairying most intensely, there a larger number live on the farms. You may put it down this way, that a man who will keep twenty-five cows and some young cattle on each hundred acres of land, will require more help the year round than a man who keeps a fewer number. He will give profitable employment to more men, and in that way he makes the whole community more prosperous.

Dairy farming will give a larger supply of food per acre by making available many crops which man cannot otherwise use. Man cannot live on grass, but if he will keep cows he can find a larger means of support for himself and a large number of others. The corn crop is just grass. Sixteen tons of corn is a large yield to the acre, but if he have enough sense to put a cow between himself and a corn stalk there he will get a yield per acre to feed four cows during the winter.

Then, since I am to speak on dairy farming in Canada, it may be as well to introduce here a few remarks as to the status of the industry in the Dominion. For the people who are themselves engaged in dairying here, it may not be of so much interest to tell what they are doing in the other Provinces, but still to show you how people are doing elsewhere, that you may even adopt some of their better practices, may not be a misspent quarter of an hour. Now, from this map of the Dominion of Canada I would like to show you what they are doing in Ontario. We have in this western peninsula a county called Oxford, and in it a place called Woodstock—a little place close by Ingersoll. (Laughter.) In Woodstock neighborhood men follow dairy farming, mainly in the making of cheese, and they supply their milk to factories which run about six months and one or two weeks in the year. And then the farmers go on feeding their cows the other five months and two or three weeks, and find almost no income from them for that period. So that Oxford, which once had the reputation of being first, is no longer first in regard to reputation, because the farmers are not making milk all the year around. Perhaps the reason is that they are exceedingly modest and may think shame of being always in the front, and so have stepped back to give the other fellows a chance. (Laughter.) Now, in this part of Ontario we formerly had the reputation of making cheese of the best keeping quality, but the people of eastern Ontario were not slow to learn that, and to adopt all the good practices they could transport, and whereas the eastern factories used to receive about a half cent a pound less than factories in the west, you will now find they sell rather above the average prices here. I can find you some factories in the eastern part of Canada and of Ontario, whose average price this last summer was 9½ cents. I don't say your cheese is not as fine, but you are not now half a cent a pound ahead of them, as you used to be a few years ago.

Then, down in the province of Quebec the habitans used to make cheese that sold for 2 cents a pound less than the west, and now I could name you factories all through the province of Quebec where the make is just as nice in quality and shape as any cheese made here, and it is going into the London, Liverpool and Bristol markets, and winning a reputation for them, because the people have not been slow to take their ideas from the west and put them into practice. With all the reproaches sometimes applied to our French fellow citizens I do not find them trying, as Mr. Adams said last night, to put their feet down just where their fathers were, but they are putting them down where they will get the most fruit from their efforts, and the more you know of these people the more wholesome respect you will have for them.

I went away up the beautiful and weird Saguenay River, where there are French speaking people only, and where I went to see what sort of farmers we have living there. They are isolated and could not speak a word of English. There are about 30 cheese factories in these two counties, and I found when I went there to give one day's lessons in the art of cheese-making that one of these men who are called "slow," "lacking in enterprise," drove 60 miles over hard roads to get one lesson, and I learned afterwards that the cheese from his factory down there sold for just one cent a pound above that of the factories around him that had not got the new methods into practice, and just as high as Ontario's. He is taking in two or three young men this year to teach them how to make cheese. The Quebec provincial government has recenty made provision for paying half the salaries of not less than fifteen travelling inspectors and instructors this season. So they are not going to be so far behind. Every pound of fine cheese made there lessens the drug of inferior cheese on the market.

Then, away at the coast of Gaspé and Bonaventure I found men making capital butter, and I found that they are keeping their outbuildings as immaculately clean as they do their houses. We find sometimes in the west, you know, stables not very much to the credit of people who have been dairying so long.

Down in New Brunswick I found cheese factories and some creameries, and the people clamoring for information on every hand to aid in the development of this business. They are just awaiting the advent of some enterprising man to establish cheese factories and make that part of the country receive the advantages of a prosperous cheese factory trade.

In Nova Scotia, a land that is in some parts rough, in others most beautifully fertile, I found the "Blue-noses" most anxious to get cheese factories, and in the Antigonish valley found eight factories in operation, and more are being established every year. Down there I found that cheese factories, on the whole, are kept cleaner in their surroundings than in some older districts where the people ought to have learned the needs of their business by long observation. Sometimes in the west you can tell when you are approaching a cheese factory when it is very far off. Like the war-horse, you can smell the coming events afar off. (Laughter). It is not a good thing to have such influences vitiating the atmosphere.

I spoke of Prince Edward Island a little last night. It is the gem of our Dominion as a grass growing country and the people are anxious to have dairying. Then, across in Manitoba they are starting creameries, and across the Northwest the farmers mostly go in for stock and some dairying, and in the Calgary region they go in for dairying. They have good pasturage and good water. Then, away across the Rocky mountains, and here I think I could give you ten minutes talk and some exhortation which would stimulate you to patriotism in thinking of that beautiful part of Canada, rich in all kinds of resources that bring wealth. Out in British Columbia and Vancouver Island the people are beginning to follow dairy farming with more profit. So, from the Atlantic to the Pacific we have the best conditions that prevail anywhere for keeping cattle in good health, for growing crops, and we have excellent facilities for transportation in the west towards the high priced markets of China and Japan. We have, on the whole, just a capital country for developing dairy farming, and by making that our specialty will make agriculture profitable in the whole Dominion.

Now, just a few words as to the way we can improve this business in our own locality. I have hinted at the way in which the food supply on our farms would be increased by giving an extra value to all that is sold and by selling everything from our farms in the most concentrated state Let me give you one illustration: People in buying food are after strength, nourishment. That is served up to them in some material. Every food we have as a rule has nitrogen, phosphoric acid and potash, and a small quantity of those things carry nourishment of some kind. Now, when a farmer puts manure on the land he puts some of these things on the land to feed the plants. A ton of that manure will cost him $2.50. A man by putting these same three things into his soil, through the laboratory of nature under his supervision, through his plant and from his animal can get the same three things; the same things so glorified and so refined that the $2.50 worth of material will sell for $25.00 in butter. So a man, you see, by dairy farming need not exhaust nature and can bring out a glorified substance carrying lots of value because of lots of *man* being laden into it. You cannot sell anything dear to-day that I know of except a man. You cannot sell a horse that has no man quality in it for more than $15, but if a man will breed a horse and break and feed it right he can be sell it for as much as he has laden in it. You cannot sell butter that has no man quality in it for more than 3 cents a pound for axle grease; but if you will load a man into it—a man's skill—you will make butter carrying a value of 25 cents a pound for the winter. Now, every man who has anything to offer to the world can get paid according to the quality of the man he offers the world, and as a man qualifies himself for doing the work of the world he can load his work with a high quality of man and get a good price, because the world is hungry for the brain products of good men.

Then I have already said that the tendency of our business is to produce all sorts of dairy products at the least cost, and that is necessary because all the trend of all markets is downwards. Then we need to have cheaper production to ensure prosperity, and we need to have it to fortify us against those low markets that are likely to get still lower. By doing that we will have a permanency that will not fluctuate. One illustration: If a man will learn to produce milk at 5 cents a gallon or 50 cents a hundred pounds—and any man can do it by putting himself to the task, with good judgment—then if the cheese sell next summer for 10 cents per lb. he will get his 3 cents of profit. Well now, if the following year if the cheese goes down to 60 cents a hundred for his milk, he still has one cent a gallon. But if he does not apply to his business a lessened cost of production when the low year comes, his profits disappear. Now, reduction in cost of production will always give permanency to profits; a large profit in a good year and some profit in a poor year.

Now, how can we make this business more profitable in reducing the cost of production? First of all by getting a clear conception of we what keep cows for. We need this first of all: a clear conception of what we are trying to do. I find this in my observation of men as well as in my own experience, that even in digging a ditch or doing the simplest of manual tasks, a man who is fortified with a clear judgment and conception of what he is trying to do is better furnished for that work than a man whose muscles only are strong and whose hands are hard. A man with a weak body who knows how to apply his strength in every case, sees what he wants to do and will do more of this work than a man who has a strong body only. A dairyman who has a proper conception of his business will see that he keeps his cow for profit, and profit always lies between the cost of production and the price of the product. A man cannot afford to keep a cow all the year round that only works a short part of the year. It won't pay to keep a cow boarding-house and not get full pay from the boarders. Still lots of farmers never think of the pay for the board. They try just to have a lot of cows, and then never look to see whether they get as much back from the cows as they give to them. Very often a cow eats more than she gives back. You never find a man who keeps a lot of boarders saying, "If I can get $20 from the lot, although one man does not pay for his share, I will let that slide." No, he wants to know whether every boarder pays his own account for his own board. If any man does not the proprietor says, "Well now, it might be more convenient for you to board with somebody else." I would rather have an empty stall in my stable any day than a cow, unless she paid for what she ate. Then it is good to have a cow pay for her board systematically. I think I once used an illustration to the effect that it was a good thing to get cows into the habit of making weekly offerings. A few years ago it was hard to get the minister's stipends paid. Then some man with good business sense thought it would be a good thing to have the people of the congregations all make a weekly offering; and it seems a good deal easier to pay a dollar a week for the support of a church than haul out $50 all at once. If you get a weekly offering all the year round from the cows they pay better. We have eight native Canadian cows on the educational list of the Central Experimental Farm from the province of Quebec. They are being educated this winter to milk three months longer, and though they do not give enough to pay for milking them now, I am educating them for next year. It pays to feed succulent food when cows are dry, so as to encourage the activities of the milking functions. If a cow lives with a man for a long time and never pays for the food she eats, the cow becomes a discouraged debtor, the man gets discouraged too, and there is sure to be disaster.

Now, in the matter of cows, it will pay a man to make sure of what he is after. First of all I would be after milk, then after milk I would be after calves to rear and fatten. Then after that I would be after beef, and if I got this I would have so much to the good. But I would never look for beef first and then after that for milk and calves.

A cow should have five points of excellence: a long udder; a soft skin, mellow and moveable; a large barrel, with broad ribs wide apart; broad lions and long rumps; and a rather long neck, with a fine cut face. These five points will almost always reveal to you a cow that ought to pay her board. It is a good plan to enlarge her capacity by breeding in a line of her own purpose. I know one man who by breeding in that way from 10, two-year-olds, 10 three-year-olds and 10 four-year-olds, got forty-six dollars and some odd cents per head from the cheese factory during the season of six and a half months. He was breeding in a straight line to get milk and then calves and then beef. I would not cross the line of continuity of my cows that would shunt their progeny on to another line that did not mean milk and calves and beef.

I would grow the best food. In this country the corn plant is at the top by far. It is freer from disease and hardier than any plant we grow. Then in growth it is best to have the stalks fairly wide, about so as to get dark coloured leaves. The plant has a function of appropriating from the atmosphere carbon, and by taking 160 corn stalks and weighing all the leaves and stalks and nubbins I found that nearly one-half of all the food value was in the leaves, one-quarter in the stalks and the other quarter in the nubbins. It is best to have these big leaves, and to let the plant just reach that stage of growth when the grain on its cobs are in the doughy state. It seems to keep best when cut then, and the plants have also the largest amount of nutrition in the easiest form to obtain.

I need not speak of the silo, because the people around Woodstock will have silos on their farms some time before twenty-five years, and I will have lots of opportunities to talk to them between now and then. (Laughter.) In other places they have silos now. They find corn ensilage keeps the cow in a healthy constitution and gives a large flow of milk. I have not heard of a single silo this year that has failed in any part of Ontario. If any of you want information on this subject I will take your names, or you may send me letters free, and I will send you a bulletin as to the growing of corn, the construction of a silo and the filling of it.

Then it is possible to augment the profit by reducing the cost of labor per dollar's worth of products sold from the farms. If a man looks after ten cows, it would not cost much more to look after twenty-five cows. As I said yesterday, I think a farmer should make it his aim to have twenty-five cows for every hundred acres. Twenty-five head of cattle would be furnished all the fodder they required all winter from, at the very most, six acres of corn put in the silo. With that number of animals he can easily furnish manure and grow more crops. The proposal may be met with this objection:—"Where can we get the cows? We cannot go north any more and buy cows." I am glad of that, because it shows that the people in the north recognise the value of their own cows. But if the cows were calving in the winter time the farmers could raise more calves of excellent constitutions. One of the reproaches that has attached to the cheese factory business is the epithet "cheese factory calves," and when a man who does not furnish milk to a cheese factory has made that charge against a farmer's stock he thinks he has annihilated the whole business. Well now, "a cheese factory calf" may be just as good and large and healthy and serviceable as the calf of a farmer in any other business, if the owner of the calf will only raise his calves in winter and furnish milk to the cheese factory the following summer. Then, in saying that we say nothing that will be opposed to the further extension of our cheese factory system. It seems to me that this winter dairying is an essential complement to cheese making in the summer time. It will give us more stock, and it will give us a larger income. We are circumstanced with advantage so as to make cheese all summer and butter all winter. We can make butter to advantage in the winter, because in England there is an unlimited demand, and our cold winter offers the best advantages for making fine butter, and for keeping it either in storage or transportation. And then we will be able to raise fine stock and remove the growing hostility between the live stock men and the dairymen, because this system will become the means of furnishing cattle for export to England.

Now, we send to England about 34 per cent. of all the cheese she imports from abroad. We send a little over 25 per cent. of all the live cattle she imports from abroad. We send only 2½ per cent. of all the butter she buys from abroad, and usually she purchases abroad two pounds sterling worth of butter for every one she imports in cheese. There is a butter market there, you see, awaiting our supply in the kind of supply they need. The Danes send excellent butter and get about 26 cents per pound in winter, and I have sent Canadian butter, fresh made creamery, which was so much appreciated that for three years since I have had letters asking for more. They liked it, said they had never had better, and if I had more like it they were ready to pay the highest Danish price for it.

Now, after reducing the cost of production in the cost of food and by prolonging the earning season of our dairy herds, we need to improve the quality of both the cheese and butter that are the products of our makers' skill. It would not be wise to enter upon a discussion of all the changes that are desirable towards that end, but among those subjects is this, that cheesemakers need more information and that they can obtain only I think through the establishment of experimental dairy stations and the work and instruction of instructors. They need, not only instruction, but supervision. It is given but to few men to do their best, day after day and week after week, without some outside supervision. The work of an instructor is mainly valuable, when the instructor goes around in a sort of a genial way, and when the maker expects some one around to see that he is doing the best he can. Then it is a good thing to have the patrons in an expectant mood concerning the visit of some stranger whom they would like to please, and they will receive him most cordially by letting him know how good is the quality of milk their cows produce. When they expect the arrival of a distinguished individual, you know how ambitious the patrons will be to furnish good milk just for the sake of his approval. Now, for myself, I would not like to have those men who do not send the best of milk to the cheese factory paraded before the public often. It would not be good or kind; but their expectation of the visits of this official inspector would be helpful. The plan would be to have one man who might be expected to drop down in any part of this province, and being under no supervision except that of some central authority, the farmers would learn but little except by his movements. He could discover the men who were sending all good milk to the factory, and if he found a man who was not sending good milk he might help him a little by bringing to the assistance of his defective moral judgment and practice the operation of the Act on milk adulteration. One lesson or two to a few would help a great many. Then I would have some man go around among farmers who were suspected of adulteration, and if he prosecuted four of the worst ones he could find, and advertised the fact of their prosecution and conviction, by putting out small dodgers and sent these out, say dropping them in the milk cans, it would be rather a wholesome piece of information.

Then cheesemakers should be induced to do their work in the very best way right to the end. The great weakness in most of our dairymen and other citizens, is that they fail in perseverance unto the end and quit when two-thirds of the way through. A cheesemaker makes the best cheese he can at the beginning of the season, but after a time there are pic-nics in the neighborhood and he does not do quite so well. Then he gets gassy curds, and he "does not believe in sitting up all night" and he makes soft, open cheese and the buyers do not want these. You will find all through life that those men only do the best who persevere unto the end ; and a man who does that in any sphere will compel success every time.

Let me conclude by saying this, that all around the world people are getting more fastidious because they are better off. In our country we are all better off than formerly, so far as I can learn. People wear better clothes, live in better houses, are more cultured in their tastes. They won't eat butter and cheese of the quality of ten years ago, and when they are more fastidious they will pay a better price for a better article. If men in present circles find this the case in marketing, there will be more difference in years to come, and since quality cannot be changed in one day it will be an ill day if we let out of existence all those agencies and factors such as inspectors and instructors who have done so much to give a better quality to our products. I think they ought to be commended and improved and enlarged in every aspect of their application. In that way I think that dairy farming in the whole Dominion can be made more profitable and will leave more profit. I have spoken of other provinces. Their success is your success, because if they make finer goods and more profits, the whole nation responds to the individual prosperity. In that way, I think, by improving the practices of dairy farming, putting into it more enthusiasm, we will make our nation what it ought to be—a nation of skilful, prosperous dairy farmers from the Atlantic sea to the Pacific coast. (Applause).

THE COST OF KEEPING A COW.

Hon. H. C. Adams read the following paper :

The cost of keeping a cow depends : 1st. On the cow. 2nd. On the man who keeps her.

A cow is not necessarily a cow ; she may be a hog, or worse yet, a dyspeptic. In any case she is a machine of greater or less power to make fodders and grains into butter, cheese and calves. She does not necessarily produce results in direct proportion to rations. In other words, 50 lb. of oats fed to one cow may make 10 lb. of butter ; fed to another cow it may make 4 lb. of butter.

Capacity to turn out butter from grass is a thing of development running along the line of heredity and stamped in breeds. Capacity to simply consume has not been bred for as a result, but will crop out occasionally among thoroughbreds, but more frequently among natives and common stock. A cow cannot " eat her head off," as the saying is, no matter how much she consumes, if she is of the right kind. By the right kind I mean a cow which makes milk, cream and butter out of surplus food. A cow which becomes more profitable as the expense of feeding her increases is the one which has the golden calf.

The smart American dairyman of to-day is not only wiggling away at the old problem of making two blades of grass grow where one grew before, but he is trying to make one cow eat what two ate before and give twice as much milk as two did before. This is done to reduce the ratio which the cost of keeping a cow bears to her gross product.

The Jersey cow " Nancy Lee," has made 4 lb. 2½ oz. of butter in one day and 95 lb. 3½ oz. in 31 days, four months after calving on ordinary food. There are a great many cows fighting flies in this country and kicking over milk pails that would not make as much butter in a year as " Nancy Lee " did in a month. They cannot help it ; their mothers and fathers and ancestors from away back where history dissolves in fiction were not trained up in the butter business.

G. W. Farlee, of New Jersey, in a statement of a year test of the Jersey cow " Signoretta " 21516, makes a clear demonstration of the importance of the individual blood and make up of a cow to this question of keeping her. The test was made on her second calf, beginning Sept. 20, 1886, and ending Sept. 19, 1887. Although only three years old she gave during this period 7,621 lb. of milk, from which was made 680 lb. 6½ oz.

of butter. At one period during the test her milk showed 60 per cent. of cream—this was when the first flow of milk had shrunken one-half. Her daily grain ration averaged 8 lb. Certainly there was no forcing process here. The cost of keeping that cow long enough to make a pound of butter was light because her ancestry had practiced the art of making butter until it had become established as a hereditary quality.

W. R. Mowray, of Oxford, N. J., published some time ago his experience with a dairy during a term of 12 years. It illustrates forcibly how the breed may save the feed. He says: "The first three years the cows were natives; in 1878 there were 3 grade Jersey heifers three years old; in 1879 there were three natives; 3 three-year-old grade Jerseys and 7 two-year-old grade Jerseys; in 1880 they were all grade Jerseys; in 1883 there were two pure bred Jerseys part of the season; in 1884 there were 3; in 1885 there were 5 pure bred Jerseys, but feed was short and I was overstocked; in 1886 about half were pure bred and half grades.

The following statement gives the average yield of butter per cow for the herd during each of the years in the period named:

Average lb. of butter per cow in	1875	125 lb.
" " "	1876	159 "
" " "	1877	153 "
" " "	1878	155 "
" " "	1879	145 "
" " "	1880	157 "
" " "	1881	195 "
" " "	1882	207 "
" " "	1883	244 "
" " "	1884	250 "
" " "	1885	240 "
" " "	1886	276 "

We have average production here changed from 125 lb. per year to 276 lb. per year by the saving grace of good blood. A gain of almost 100 per cent. or a reduction in the cost of butter by more than that percentage. The tail cannot be bred off a monkey in a minute, and the butter cannot be bred into a steer masquerading in a cow skin in a generation. Every cow has her individual limit of butter production fixed at birth in her physical and nervous constitution, just as a child carries in its infant brain the limitations of its matured intellectual power. If that limit is low she is a costly cow, not in spite of fate but because of it The man who undertakes to lift a mortgage with her is on the wrong end of the teeter, and will get lifted himself if he breeds to her kind. A corn planter is an expensive tool to dig potatoes with. A poor cow is just as expensive a machine for making butter fat out of feed. She was made for some purpose not yet discovered.

Next to the cow in the economy of feeding stands the feed. It looms up so prominently before many men that they cannot see the cow at all. They have a notion that the cow in her milk production is as flexible as the elements. Along with the battered old statement that "money makes the mare go," they ring in its companion piece "corn makes the cow go," and it does, it makes her go dry a great many times when she might be going in the "milking-way." The cow we are talking about is a dairy cow. A percentage of the food taken by every cow is undigested or not assimilated; the percentage of loss sometimes runs as low as ten, sometimes as high as sixty per cent. It is not the animal which eats the most, but the one which assimilates the greatest percentage of food consumed which is most profitable.

A cow is fed for four purposes, to repair the natural waste of her body, to keep her warm, to sustain the embryonic life which she carries, and to make milk. These purposes demand two kinds of food, the heat making and the flesh and bone forming. To understand the proper ratio in which these foods should be mixed in a complete ratio has been the object of exhaustive scientific research. The result may be stated in a general way as requiring one part of the albuminoids, or flesh forming elements, to five parts of the carbohydrates, or heat producing elements. Food so proportioned is fed with the least loss under average conditions. A cow cannot be fed cheaply upon bran alone, or hay alone, or cornstalks alone, or cornmeal or clover, for the one reason if there were no others, that in themselves they do not furnish food elements in the proportion required. Straw, barley, cornmeal, corn fodder and ensilage make heat and fat. Bran, middlings, oilmeal, cotton seed meal, malt sprouts and oats have a much greater proportion of flesh and bone material. The art of cheap feeding consists in combining these or other foods in right proportion, and selecting such as can be obtained at the least cost. The comparative cheapness of a ton of a given feed cannot be determined by the price of it. Under certain circumstances oilmeal at $30 per ton is cheaper than cornmeal at $15 per ton, because oilmeal contains three times the digestible flesh forming material found in cornmeal, and one pound of it will go as far in restoring a ration poor in albuminoids to its proper composition as three pounds of cornmeal. Straw is almost worthless fed with corn or ensilage; fed with timothy hay and oilmeal it is quite a valuable feed. This matter of economic feeding has been forced upon the attention of dairymen by the necessities of the times. With a gradual yet constant shrinking of prices has come a vigorous and effective effort to lower the cost of production.

If nothing can be done to raise prices something can be done to reduce expenses. Thought and knowledge are as valuable applied to questions of cost as to questions of price. The manufacturer brings all knowledge within his reach to bear upon the matter of economical production in even the minutest details of his business. The farmer has been studying his methods. The agricultural press is filled with enquiries about the digestibility, or the chemical analysis, or the feeding value of this or that food. Prof. E. W. Stewart, in a reply to an Iowa correspondent, recently gave the following as a good daily ration for a large cow: 18 lb. timothy, 8 lb. oats, corn and cob, 6 lb. roller bran, 3 lb. oilmeal.

With hay at $10 per ton, corn and oatmeal at $18, bran at $14, and oilmeal at $25, we would have a daily ration costing: for hay 8 cents, corn and oatmeal 8 cents, bran 4 cents, oilmeal 4¼ cents, making a total of 27 cents. The prices given are lower than at present, but they are just now abnormally high. Upon the Wisconsin basis of average prices, which has been assumed, the "big cow" would be an expensive creature. She is provided in this ration with 17 lb. per day of grain feed, 12 lb. per day of grain properly fed is sufficient for the ordinary Wisconsin cow; this would reduce the daily expense to 22 cents. A much cheaper ration, which would be approximately correct in its nutritive ration, can be made with—

10 lb.	fodder corn, costing	2 cents.
10 "	hay, "	5 "
5 "	bran, "	3½ "
5 "	middlings, "	4¾ "
2 "	cornmeal, "	2 "
	Total	17¼ "

or $31.05 for the 180 days of the year which constitutes the feeding period. Pasturage can ordinarily be obtained for the balance of the year for $10, which would make the cost of feeding the cow for a year if everything was purchased, $41.05. Advocates of ensilage claim that 50 lb. of ensilage per day, and 10 lb. less of bran, will give a cow all she needs. Various estimates are given as to the cost of ensilage. It undoubtedly costs $1.50 per ton in the silo, 50 lb. would then cost 3¾ cents; 10 lb. bran, 7 cents; total, 10¾ cents. At this rate the winter feed of a cow would only cost its owner $19.40, and the total annual expense would be $29.40.

One point must not be overlooked in the question of economic feeding. Rations must be varied at times to give zest to animal appetites. A costly food highly relished is sometimes cheaper than a low priced food of which the animal has become tired. A cow is like a human being she likes and needs variety in her diet.

The perfection of the digestive and assimilative process are more dependent upon appetite and taste than is generally supposed.

The grass of the early pasture produces more per 100 lbs. of actual nutrient material than any other feed known. No other food is so relished by a cow. Cows will often leave good clover hay to eat some old rotten straw, and the hired man comes along and wonders what the old fool is thinking of. She is in the same fix as the Democrats were a few years ago in Wisconsin, and the Republicans are now. She wants a change. It is not necessary to give her muffles for breakfast and Saratoga chips for dinner, but give her a change of grain ration every month. All grains to be fed most economically should be fed dry. We only except malt sprouts; they have a swelling power, only equalled by an American imitation of an English snob. They throw dried apples completely in the shade. They should be wet with three times their bulk of water or skim-milk. Dry feeding means more complete mixture of saliva with the food, as it is necessarily eaten slowly. Grain should be fed upon cut fodder or fine hay. It thus becomes a part of the cow's "cud," to use a common expression, and is re-masticated with the coarse feed. Only in this way can anything like thorough digestion of grain be obtained. When grain is fed singly in large rations to any animal, it passes rapidly through the digestive tract and appears in considerable quantities in the excreta unchanged. Prof. E. W. Stewart estimates this loss to be from 30 to 50 per cent. of the value of the grain so fed. It is a matter which materially affects the cost of keeping a cow. Another feature of the case is that the vitality of the cow is weakened by her imperfect digestion. The cost of keeping a cow is also dependent upon the kind of water she drinks and its temperature. Impure water in summer and cold water in winter does not pay, they cost too much. In the first case, the health of the cow is affected, and in the second, it costs more to warm the water inside the cow than it does outside, for the very plain reason that cord-wood is cheaper than corn-meal.

In a dairy of 20 cows the water can be warmed to a temperature to 80 or 90 degrees during the coldest weather of winter at a cost for fuel of $1 per cow. Experiments at the Missouri Agricultural College show that warm water saved them 10 per cent. of the feed. If feed cost $30 for the winter there is a saving of $3 for each cow. This is in a state where the charms of a Wisconsin or Canada winter are unknown. The general testimony of men who warm the water for cows, is that it increases the milk flow upon the same feed from 10 to 25 per cent. No improvement over the old system of dairying is more marked or certain than this. It has been urged that it is contrary to nature to warm water for a cow, that we are making her an artificial creation, that she is losing the hardiness of the beautiful rainbow-backed creature of the olden time, who simply "humped herself" to meet the exigencies of the weather. Of course, she is an artificial creation, and the more artificial she is, the better we like her, and the more she is worth.

Men have done a pretty good job with awfully raw material they found in the primeval cow. They have bred off the surplus bone and the surplus flesh and unnecessary hair, and the tail like a fence post, and the horn like an elephant's tusk, and the empty head that adorned the old native, and given us a cow that has brains and beauty, and can give us milk. Cows in a state of nature were milked by calves.

The men who are worried because cows are being twisted from their original bent should let the calves have a show.

Cows can be made hardy, there is no doubt about it, but it costs too much. The hardiest cow I ever saw was frozen stiff on the chilly side of a fence in December. She had risen in the scale from comparative hardy to positive hard. One thing more about feeding—except where land is cheap and labor high, soiling will diminish very materialy the debt side of the cow account. During the last season I fed 24 cows 18 days upon southern ensilage corn fodder grown upon one acre of ground. The feed would have carried one cow 432 days, or one year, two months and seven days. The cost of raising the acre of fodder corn was as follows:

Plowing	$1 25
Planting	50
Seed	50
Harrowing	1 50
Cultivating	1 50
Cutting and feeding	4 00
Total	$9 25

This is a cost per day per cow of less than 2½ cents. Prof. Henry in his annua report for 1885 gives details of an experiment showing comparative results of soiling and pasturage. From tables given, we find that one acre of pasture gave 1,779 lb. milk which made 82 lb. butter; one acre of soiling gave 4,782 lb. of milk which made 190 lb. of butter. The acre of pasture made $20.50 worth of butter; the acre of soiling made $49 worth of butter. It cost 2½ times as much to let the cow get her own feed as it did to carry it to her. It is but fair to state that in this account the cost of handling the soiling crop has not been computed. It is reasonably certain that the old-fashion pasture will be too expensive a luxury for the next generation. Finally, with the cow bred for her business and the feed adapted to the cow, we need a man competent to handle both.

With incompetence, we have wasteful feeding, careless housing, rough treatment, and irregular habits, all active enemies of economy in the dairy.

The incompetence is usually the results of thoughtlessness, rather than absolute incapacity. When a farmer begins to think in earnest he runs rapidly to correct conconclusions; but the trouble often is, that it seems to make him tired to even think of thinking, when perhaps ten minutes of thought would save him ten hours' work. A man who will not think, and think hard, has no business with a cow. She will beat him every time. She is as susceptible to intelligent and thoughtful treatment as an invalid is to changes in the weather. Make her warm and she will eat less, and give more and better milk; keep her clean and food is saved that would otherwise go to repair the nervous waste caused by discomfort; feed her regularly and we get that perfect digestion and assimilation of food never known in the hit and miss system. A good cow is well-bred; she despises rough ways and hard usage. She has no respect for the man who swears at her. She balances accounts with him by shutting down on his milk supply and raising the cost of his butter. She is not to be fooled with; she has dignity and self-respect. She is the product of brains and good nature—and it requires good nature and brains to manage her profitably.

Mr. Adams, commenting on one point in his paper, said: About the warming of water, with me it has been a very important matter. I recollect having 41 cows in one lot. The young man and myself who went into business together got into debt and had to do the best we could to dig out of it. We didn't get enough milk to satisfy us, and tried all sorts of means and manner of feeding, and my partner even used to get up at midnight to see if we could increase the yield by feeding at night: but we could not get more milk. In talking to an Englishman, he said to me, "I will tell you; go to warming the water the way they do over in England." I got a kettle that would hold 40 gallons and fixed up a place for the fire under it and we heated the water until it came to blood heat, and in it stirred bran and shorts. Well, it was just astonishing the way the cows increased their milk supply. I thought, perhaps, they would give more milk if I could get them to drink more water, and I began to put a little salt in the water to increase their thirst; but it reduced the quality of their milk, which was not the case when they got simply warm water mixed with a little bran. Our experimental station has tested and found only a slight increase by the use of warm water in the production of butter. That can be explained because the cattle have model quarters. The average farmer does not have any such surroundings, and he gets a much larger advantage, and I would say to every farmer who has a cow, if you want to increase the product give her warm water.

A VOICE.—I have listened with great interest, and I trust some profit, to Prof. Robertson and the Hon. Mr. Adams. They have made some excellent points, as far as I can judge, which if put in practice will be very beneficial; but there is one thing I noticed in both of them, that the more "man" you can put into the work, the larger amount of benefit and profit you will get, both with regard to the making of cheese and the feeding of stock. It just occarred to me that our experts want some stimulating to bring about this end and that our best men are not paid as they ought to be. I would suggest that the cheesemakers form an association and fix a scale of prices, and shape things as they ought to be shaped. Things are so ground down in our day that men merely make their positions as cheesemakers a stepping stone to something else. The lowest price men get factories generally. The owners employ cheap hands and buy cheap materials, and these things are a great hindrance to the quality of our cheese.

The convention adjourned till 2 o'clock in the afternoon.

AFTERNOON SESSION.

On resuming, the question drawer was opened.

QUESTION DRAWER.

QUESTION.—What is the best method of removing taint from curd, or can taint be removed from the milk before manufactured?

Prof. ROBERTSON.—It is much easier to puzzle a man than to give him something easy to answer, and if I were answering that question straightforwardly, I would give *Punch's* advice about getting married. "Don't get into the trouble." But the only way to remove any volatile taint from milk is to have it aerated, that that taint may evaporate; and after that, the only way to cover up taint is to develop a large degree of lactic acid. So by the aeration of milk, and the development of acid in the milk, after it is partly dried, you can first remove part of the taint and then hide the rest.

A VOICE.—Can you remove the taint entirely?

Prof. ROBERTSON.—You cannot entirely remove any taint from milk. After all, in the matter of taints, *Punch's* advice is short and to the point—"Don't."

QUESTION.—Don't you think it would be a good idea for factory men to club together and get their dairy supplies from one man? Don't you think they could be got a great deal cheaper than they are at the present by so doing?

Prof. ROBERTSON—We will suppose that I am not a government servant and that I am in the dairy supply service. If I were in the dairy supply business I would try and get all the cheesemakers to club and buy from me. But as I have at least twenty good friends in the dairy supply business I am unable to recommend one of these as furnishing better goods or offering better prices than another. I don't believe in advocating combinations for the purpose of getting good supplies. If a man will insist on getting the best supplies, he will find competition now sufficient to put the price as low as it can be.

QUESTION—I should like Prof. Robertson's opinion on the extra heating of a gassy curd, say to 105 or 106 degrees, immediately before dipping?

Prof. ROBERTSON—I would not approve of that practice. I do not think a gassy curd should be heated above 100 degrees and should not be allowed to go below 94 degrees after the acid has developed. Extra heat makes a curd rather corky. That is the effect of gassy curds, anyway, so you see you add to the evil by increasing the heat above 100 degrees.

A VOICE—At what heat would you have the water when you wash the curd?

Prof. ROBERTSON—I would put it in the water at about 100 degrees. I would never put the water directly on the curd, but on a cloth over the curd.

Mr. THOS. DILLON—I would like to know the effect on cheese of taking hogs to the station one day and cheese in the same waggon box perhaps the next day? A great many farmers in the fall of the year will get up on the boxes and walk with dirty boots, and by the time they get on their load the figures on the boxes which show the cheese are completely covered with dirt. It must have an injurious effect. I find people taking in turnips one day and cheese to the market the next day, without anything to protect the boxes from the dirt from their fields which has been shaken off their turnips.

Prof. ROBERTSON—The wrong practice mentioned by Mr. Dillon is one that does the trade a good deal of harm. It is easier to point out a bad practice than to suggest a remedy; but I think a cheesemaker's duty is to stand between the man who produces the milk and take supervision of the goods he has made up until they are put on board the cars or in the warehouse. If a patron came to a factory under my care with such a foul box as has been described, he might go home with his box and another should take his place, and he should be charged with the drawing of that cheese. The value of the suggestion is here, that the appearance has so much to do with the price that no cheesemaker should allow his reputation to be damaged by having anything done that will lessen the value of the goods.

WORDS OF WELCOME.

Mayor **Douglas**, of Woodstock, was then introduced, and said: On behalf of the town council of Woodstock, I appear to extend to you a hearty and cordial welcome to the town of Woodstock. It gives me great pleasure to see that the interest in dairying manifested by the meeting held in Woodstock some years ago not only still exists, but has grown to a greater extent than previously. We in Woodstock are always glad to welcome to our town associations which are working for the common weal; but more especially are we glad to welcome to our midst an association like this, which has placed itself in the front ranks of those that are working for the advancement of one of the most important interests of Canada. I desire just here, on behalf of our town, to also specially extend a welcome to the Hon. Mr. Dryden, who appears in Woodstock for the first time. It is well known that Hon. Mr. Dryden has always taken a warm interest in agriculture, and I am sure it is a pleasure to his fellow citizens in Canada that he has been elevated to the high position of Minister of Agriculture. I also desire to welcome among us our American cousins, who, at great inconvenience to themselves, are present to-day. I refer to Governor Hoard, of Wisconsin, and Hon. Mr. Adams, of the same State. I am sure it is a pleasure to us at all times to welcome in our midst our American cousins. It is a pleasure to us to know the high standing which the dairy interests of Canada have taken in Great Britain. The standing which this interest has taken over there can be raised greatly by meetings such as you have here at the present time, and by the interchange of thoughts and ideas about methods among yourselves. By this means I believe in the future the dairy interest of Canada will attain a far higher position even than it occupies to-day. We know there is always room at the top, and it is pleasing to us to feel that there is a healthy rivalry between our American cousins and ourselves as to who will take the first place. I am sure our American friends here are not selfish enough to wish that the Canadians may not be the first in getting there. There is one matter which has attracted my attention, and I do not think it will be out of place to mention it at the present time, and that is the great interest the newspapers have taken in your meetings. It is to their credit that they have paid such attention, and given such full reports. For, while to those here the meetings are beneficial, the words spoken by the press are scattered in the homes of thousands of readers, and those far away thus participate in the benefits of our discussions. I am sure I can wish for nothing better for the association than that it shall always go forward, and that the interests of dairying, interwoven as they are with the interests of our country, shall always increase its prosperity. I hope that your meetings here will be pleasant. I regret that your stay is short, but I hope that the meetings will not be of interest only to the Association, but of profit to ourselves and to those in the surrounding country who have come here to hear what you have to say. I am sure it is a great pride to every lover of his country to know that it is being developed. I express the sentiments of the council and citizens of Woodstock, when I say that in future I hope this industry may develop far more than it has done in the past. I again, on behalf of the citizens, extend to you a hearty welcome to the town of Woodstock. (Applause.)

Mr. **Grant**, President of the Board of Trade of Woodstock, was next introduced and said: I have very great pleasure in being present this afternoon to meet this large and representative gathering, representing this large and impertant interest. I am sure any one who is at all aware of the importance of agriculture recognises that it is the first of all our important interests. As a member of the Board of Trade I know that agriculture is the interest on which all our prosperity depends, that every interest in this country is dependent upon agriculture; and while we have among us men of various minds, we all know that the great dependence we have after all is agriculture. I am sure, therefore, we are all glad to know that the dairy interest is in such a prosperous state. I am glad to know that after all the changes of laws and tariffs, still there had been nothing unfavorable to this great interest; but fortunately we depend for our markets on a country that does not raise tariff walls. We depend on the Old Land, where the people welcome the products of every land. We are glad of this and also glad to know that that interest is developing which we so largely depend on in this section, and that it is not affected by those evils to which I have referred. I am glad to welcome our American friends. I had the pleasure of listening to one of these gentlemen last night, and I am sure the audience must have been highly delighted with the words of the honorable gentleman. I have no wish to take up your time, but on behalf of the Board of Trade I heartily welcome you to our town, and hope that the holding of the meetings here may be repeated, for I have heard dairymen say that one of the most successful conventions which you ever had was held here a few years ago, and I hope this one may be just as successful and just as profitable. (Applause.)

Mr. C. E. **Chadwick**, Secretary of the Association, replying, said: It has given me a great deal of pleasure, indeed, to be present with you on this, I think about the 21st or 22nd of these conventions. I do not think during that period there has been more than one or two gatherings at which I have not been present, and participated more or less in the business of the meetings, and I can assure you the present one has been successful in a more marked way than any of the previous ones. We meet here men representing the bone and sinew of the country, who, with true patriotism, are only desirous of developing the interests of our country. I see with me here fellow citizens standing on one common platform, whose purpose is to gain knowledge and secure the dissemination of the success of an industry which has grown from very small beginnings to one of the most important of our country. It was with no little discouragement that this organisation was first formed. It met with those perils which are apt to affect every organisation at first. Those perils have been overcome. We have a great proof of this in the audience assembled on the present occasion, which tells us that we have grown to that degree that we can hardly find a hall large enough in this town to hold the audience. I was very much pleased, indeed, to hear the remarks of the mayor. There was a cordiality about them that made me feel that we had a Canadian sentiment, a Canadian feeling, a feeling of patriotism which to me was peculiarly pleasing. And that is what I want to see in every one in Canada who has an interest in the development of our country. If we act upon that principle, and unite upon it, there are no bounds to the success of our country. It is now more than 60 years that I have been an inhabitant of Canada, coming here when the country was a forest. What do we see now? Extensive buildings, large industries, large commercial transactions transpiring on every hand. People who were struggling for an existence we now find indulging in all those luxuries necessary to the comfort and well-being of the community at large. I was glad to hear the President of the Board of Trade, who came to recognise us. Gentlemen, this institution is forcing itself upon public notice. There was a time when we met, and but little attention was paid by the outside public to our doings. A different state of sentiment is prevailing now. We find public men where we assemble tendering a cordial reciprocity of feeling which is necessary and gratifying to us. I feel gratified to find that we have so excellent a meeting, and that we are so cordially acknowledged by the town of Woodstock. (Applause.)

ELECTION OF OFFICERS.

The report of the Nominating Committee was then read and adopted. It recommended the election of the following:

President	Thos. Ballantyne, Stratford.
1st Vice-President	John Geary, London.
2nd Vice-President	Wm. Messer, Bluevale.
Directors.	
Division No. 7	Robert Cleland, Listowel.
" No. 8	Harold Eagle, Attercliffe Station.
" No. 9	E. Casswell, Ingersoll.
" No. 10	John Ballantyne, Pine River.
" No. 11	Alex. McLaren, Stratford.
" No. 12	Wm. Symington, Camlachie.
" No. 13	John Prain, Harriston.
Secretary	C. E. Chadwick, Ingersoll.
Treasurer	J. C. Hegler, Ingersoll.
Auditors	John S. Pearce, London. John Robertson, Gladstone.
Representative to Toronto Industrial Exhibition	Benjamin Hopkins, Brownsville.
Representatives to Western Fair, London	James Carmichael, Arva. John S. Pearce, London.

RESOLUTIONS OF CONDOLENCE.

Moved by Jas. W. Robertson, seconded by Mr. Hopkins, and resolved that: It is with sincere regret that we learn of the prolonged illness of our esteemed President, Mr. J. B. Lane, which has deprived us of the pleasure and benefit of his presence at our convention; and we hereby place upon record an expression of our sympathy with Mr. Lane in his affliction and convey to him our earnest good wishes for his speedy and complete recovery.

Moved by Jas. W. Robertson, seconded by Mr. Hopkins, and resolved that: This Association has learned with deep regret of the sad and sudden death of the late Mr. Wm. Weld, the founder, proprietor, and editor of the *Farmers' Advocate* of London, and hereby places upon record its high appreciation of the valuable services which he rendered to the agricultural community of Canada, by his long advocacy of improved methods and more intelligent practices in the carrying on of their business, and we deplore the great loss which the country has sustained by his decease.

THE DAIRY COW AND HOW TO MAKE HER PAY.

Hon. W. D. Hoard, Ex-Governor of Wisconsin, being called upon, said: Mr. President and fellow-dairymen: We may be sure of one thing, that whether we are Yankees or Canadians, the wind that blows across the borders and gives us our breath, stops not at national lines. (Hear, hear). We may be sure of another thing—and thank God for it—that the language we speak is a common vehicle for the conveyance of a common understanding. We may be sure of another thing, that we are dairymen seeking a common knowledge for the prosecution of a common purpose, and that there are no lines between us in this pursuit. Therefore we come together as dairymen—not as Canadian dairymen, nor as United States dairymen so much, but as men seeking a better understanding and a better "reason for the hope that is within us." Therefore I do not feel that I come before you in the light of a representative of any nationality so much as the representative of a little thought. It is thought we are after. We must think, and the head must constantly precede the work of the hands, and therefore I invite your attention to a few thoughts that have been coined out of years of study and conclusion along the lines of this our common purpose and our common vocation. It is not always pleasant to be engaged in chiding, but you know what the old Presbyterian dominie said: "My freens, he says, "it will nae do for me to be speaking to you aboot the gifts o' grace, because gin I do ye'll get two over-toppin' in yer opinions o' yersels; I better be doing a little on the other side—telling ye whar I think ye must do, and maybe the Lord will bless the words I drop." So in this line—and the line of my thought will be directed as it is, for I bend towards the man who makes the milk. The factory or creamery will take care of itself, though I represent in my own person the creamery interest, but I represent in my own deep interest both of these lines. It is the man who makes the milk that must be constantly reached after. You know the pool in the Scripture account was agitated by an angel who came down every little while and stirred it up; it was not for the purpose of doing the pool any good, but for the benefit of the man who was going to step into the pool. You know the factory or creamery is a pool. We pool the milk together, not for the benefit of the creamery, but to do good to the man who is going to step into the pool.

When the yearly account of the average patron of a cheese factory in Canada or the United States is looked at in the light of good business sense one is astonished at the fact that intelligent farmers, men who call themselves well-posted as the world goes, should be content with such poverty-stricken returns. Something should be done at once to arouse these farmers to the necessity of immediate reform of their ideas and methods. I am credibly informed that the average yield per cow among the cheese factory patrons of Ontario is about 2,700 lb. of milk a year. I am also credibly informed that the average value of milk for cheese-making the past year was 70 cents a hundred. 2,700 lb. of milk per cow at 70 cents per hundred would give $18.90 as the average return per cow from the factory. Allow $6 as the amount the cow will earn in butter before and after the factory closes and you have $24.90 as the average earnings of the Ontario cows for the past year. Any man of sense knows that this sum will not pay for the food consumed on the farm, saying nothing of the cost of labor. All we have left is the manure. One would naturally expect under such circumstances that there would be close, practical, intelligent efforts put forth to save this manure, the last earthly hope of these farmers for profit. But here again are we confronted with the same demon of waste. Go anywhere, you will find in 90 cases out of 100 the same old folly of manure piled in heaps at the sides of the stables under the wash of the eaves. It actually seems as if men really tried to make the manure as worthless as possible; to get as little out of the cow in this direction as they have in others in a word, to make as little money as they consistently can.

The strangest thing on earth is the indifference and contentment which prevails among dairy farmers on this subject of poor cows and worse methods of farm management.

The next strangest thing is the amount of pounding they will take and not stir a foot out of their everlasting unprofitable tracks. What can be the matter with these farmers? Don't they want to make money? Don't they want to conduct their business so as to have as large a margin as possible above the cost of carrying it on? When every man in the world but themselves can see that they are boarding five out of ten cows at an absolute loss, what makes them so blind to this important fact. Go to any manufacturer and show him that some of his machines are running him in debt every year, and you will see them repaired or displaced for better ones in mighty short order. What makes the average cheese factory or creamery patron hold on to the poor cows and wasteful methods with such deathlike grip when more successful men tell him he is wrong—when his own pocket tells him he is wrong? I don't know and I don't believe he does either. (Laughter.) I have been trying for the past few years to get some information on that point and I suspect that he has as yet taken no pains whatever to find out what it really costs to keep a cow, or what constitutes a profitable cow. It is not that he is lacking in brains. He has as many brains as other folk. He has simply allowed himself to become mentally lazy. It is impossible for him to know the truth unless he works for it. The truth about your business is like any other. You cannot harvest if you don't sow. A study of the truth must be had if we reach the truth.

To see how matters stood with these average cow farmers—what they had done to know the truth of their own business, I put the following questions to 1,000 patrons of cheese factories and creameries: "Have you ever set to work to know what it costs you to keep a cow for one year?" Out of the 1,000 nine hundred and eighty had made no effort to know this important fact. They could guess all over the question. From twenty dollars to fifty dollars was the average. Only twenty out of the 1,000 had seriously set to work to know something for themselves about their business in this particular Think of it, my brothers! Should we not be ashamed of such indifference, especially when it is costing us so much? Another question, equally important, was asked of 200 average, well-to-do patrons of cheese factories: "Have you ever made any effort to know what each of your cows was producing for one year?" Out of the 200 197 answered "No." Now, that is as near as I have got in determining what percentage of dairy farmers are really dead in earnest to know what they must know or be badly punished for not knowing. It looks bad. It is the lack of this necessary knowledge that makes the beggarly showing in pounds of milk and pocket for the patrons of Canada and the United States. It saddles the hard-working farmer with the cost of keeping two poor cows, waiting on two poor cows, stabling two poor cows to do the work of what should be done by one ordinary good cow. Do you wonder he is bowed down and discontented with the business? Oh, that he would stand up and look his own deficiencies in the face!

What does it cost to keep a cow a year on the ordinary dairy farm? In the first place what is the pasturage worth? I find that it takes from three to four acres of land, as farms run, to pasture each cow,—call it three and a half acres. What is this land worth in your dairy districts? Dairy farms sell for about $40 an acre. If my figures are too high or too low adjust them to suit the fact, but this is my best information. Now, the cost of pasturage is the interest on what the land will sell for; the taxes and annual depreciation in fencing—all of them cash itema. Three and a half acres at $40 per acre represents $140 invested in land to pasture a cow. What is your interest rate? Call it seven per cent, which will amount to $9.80. The taxes may vary, but may be fairly set down at this valuation, at one per cent. or $1 40. The depreciation in the value of the fencing will also greatly vary, but it cannot be less on ordinarily fenced farms than one per cent. annually. This would amount to $1.40. It usually requires the labor of one man for ten to fifteen cows, but we will allow the manure to offset that, provided you will agree to handle the manure so as to get your pay. At the estimate I have given, it costs the average farmer, to pasture the average cow, as follows:—

Interest on 3½ acres of land at 7 per cent.	$9 80
Taxes	1 40
Depreciation in value of fencing	1 40
	$12 60

Winter Keep.—To keep a cow through the winter in such condition as she will do her best the next summer is a matter of common necessity. Hence she must be well kept. This will require the value of at least two tons of the best hay, which in Wisconsin may be set down at $16. Add to this at least $3 worth of grain, to keep her in the tone and condition I spoke of, and you have the sum of $19 as the cost of winter keeping of the average cow. This makes a total for the year of $31.60. If you think the figures are so high as to upbraid your conscience too much, cut them down, but remember your pocket. Now, compare what you get from your average cow—$24.90—with what she costs to keep, and tell me honestly do you think it pays to be an avearge dairyman and keep an average cow? The only way out of the woods is to be more than an average dairyman in your understanding of your business, in the methods you practice. The moment you do that you will not be contented with this average cow. The average cow, which costs more than she gives, is always the product of the average dairyman. The dairyman was produced first.

Let me suggest a few things for you to consider: First, set about the task of knowing for yourself just how many pounds of milk each cow in your herds produces every day in the year. Don't think this is such a big thing to do. Buy one of these double-indicator spring scales. One of the indicators is stationary, as in the ordinary scale; the other is movable. Hang the pail on the hook and push the movable indicator to the upper, or zero mark. When done milking, hang the pail again on the balance. The stationary indicator will record the combined weight of pail and milk, and the movable one the weight of the milk alone. Tack up behind each cow in the stable a strong sheet of manilla paper, ruled off, with the months and days. Hang a cheap lead-pencil beside each sheet. In this way set resolutely to work to know the all-important facts of the dairy production of your cows.

Breed Better Cows.—Our average dairyman must have a better cow. That is very evident from what we have seen. How will he get her? Breed her. He can buy good thoroughbred bulls of every dairy breed at fair rates. Don't be fooled into the notion of a grade bull, get a thoroughbred. Breed your cows in January and February so they will calve in September and October. That will push you into winter dairying. Don't be afraid of it. My word for it, you will never regret it. The cheese factory will accommodate itself to your notion mighty quick. When you commence to make milk in the winter then you will commence to study the finer economies of good stabling, the production of cheap food, like ensilage and the way to handle a dairy cow. Then you will hire your help by the year and thus get your help cheaper and turn a long and expensive winter to profitable account. You will find that it costs only about 15 per cent. more to keep a cow in milk, if you have a warm stable, than it does to keep a dry cow, as she should be kept if she is to do well the next summer, while the winter milk is worth 30 per cent. more than the summer milk. Then again a cow calving in September is six months in milk when she strikes the fresh croppage of spring grass and thus enlarges the flow. When a cow calving in March or April is six months in milk she strikes shrinking feed and colder weather and naturally shrinks instead of enlarging her flow. Thus a winter cow of the same capacity will yield more milk in the year than a spring cow. I believe the coming system here in Canada will be to have the cows come fresh in the fall, make butter through the winter, thus having the skim milk to feed the young stock. That will give them a good six months' start on skim milk, and at the end of their six months period they will get the benefit of the fresh pasturage, the same as the cows, and it will have the same effect in their growth that it does in milk with the cows. When spring opens turn the milk to cheesemaking and continue till July 1st. Then dry off the cows and give them a rest until September again. Another important gain under this system will be that both the patron and factory will have a ten months' season of business instead, as now, one of six or seven months. It is a very easy matter in these days of separators for a factory to adjust itself to both butter and cheesemaking in the way I have indicated; but remember the first move towards this end must be by the patron. He must produce the winter milk before we will have the winter factory.

In the foregoing remarks I have endeavored to indicate in the main two things, the evils of the present system, as produced by the average dairyman with his average cow and average method of doing things. He must brace up and correct his ideas, for his ideas are wrong, and as a consequence his practice is wrong. "As a man thinketh so is he." I have tried to indicate what I believe would be a profitable change in our co-operative work, viz.: winter dairying.

I wish before I close, however, to read to you as an instance of the present care of cattle in Ontario, something that was received for my paper the other day from my Canadian correspondent. Lest you should say I am exaggerating the condition of things here, I am going to give you the testimony of a man who will stand as state evidence:

> THE COW'S CHRISTMAS EVE.—*Ed. Hoard's Dairyman.*—Driving across the country the day before Christmas, I passed a herd of twenty-four dairy cows. It was about 5 o'clock p.m., and the unoffending creatures stood where the teeth of a bitter northeast wind could gnaw at their vitals to the greatest possible advantage. Behind the bars of that cheerless, open field they patiently and plaintively waited for the coming of their heartless owner, or attendant, to hunt them home, perchance, with a dog. That would warm 'em up, and help let down the copious streams of milk which those shivering bovines had elaborated while they browsed around among the hemlocks and tamaracks of the adjacent swamp, or nibbled at the luscious tufts of grass, brown and stiff, that here and there cropped above the snow. This is no fancy but plain facts, without gilt or varnish, and in Ontario amid the full blaze of dairy gospel day! Shades of Arnold, and Harris, and Lewis, the men who long ago taught our dairymen to treat their cows as gently as they should a woman and a mother, can these things be! We certainly know better, but too many farmers will not learn to *do*. The heathenish owner of that herd had no thought that the Christmas gospel of "good will" applied to dairy cows. He sowed to the northwest wind—what will he reap?

I wish also in this connection, to read to you another little extract, which is the work of a progressive dairyman, Mr. C. P. Goodrich:

> C, P. Goodrich, of Fort Atkinson, gives a short talk "How to make Dairying Profitable," as follows: "The only way to find out about anything is to keep an accurate account. Different cows must be tested as individuals. One must first find out how unprofitable dairying is under the old plan. The first item is to reduce the cost of production. We feed each cow $30 of feed per year, consisting of one acre of pasture, $5; 5 tons ensilage, $5; 1 ton clover hay, $5: 1 ton bran, $15; and make from each cow 320 pounds of butter, costing for food per pound of butter, say 10 cents. We estimate the cost of care and making butter at $20 per year, per cow, making a total cost of $50 per year for feed and labor. We get in return 320 pounds of butter, which we sell at 24 cents, $76.80; skim-milk worth $10; calf worth $3; a total of practically $90, or a profit of 80 per cent. on his $50 invested. Without the silo it would cost, at least, $40 per cow. Good care is a great factor in reducing cost of production. One day's exposure to a cold October rain reduced my twenty cows from 28 pounds of butter per day to 25 pounds, and I have not yet been able to feed and pet them enough to recover it. Marketing is a very important point. We first used to trade butter for sugar at the store, pound for pound, but that did not pay. We have tried getting private customers at a stated price the year around but found it unsatisfactory. When butter was higher they wanted all we had; when it was lower they did not want so much of ours. Had been most successful in shipping to a reliable commission house. Have been shipping to one house steadily every week for the past eight years; always shipped the same day of the week, and the same butter, didn't make it the way we liked it, or the way my wife liked it, but the way the consumers liked it. We averaged 24 cents through the year. A farmer could make it pay with ten cows, but more would be better. Must make butter winter and summer, about the same quantity, and always the same quality. Results were only to be attained by hard work, close observation, and persistent application."

We have in our creamery a weather account, and we discover that the milk yield slides up and down according to the weather. Accordingly, every man ought to watch the weather. Why? Because the intelligent man sees the coming of a cold storm; he does not want to pay in milk for that; the cows are brought up and put in the stable and the yield is not diminished. Mr. Goodrich, made his cows produce 357 pounds of butter in one year. But this was the result of thinking. You may not be able to do this to-day, or to-morrow, or next year ; but let us have an understanding of one thing, that if the Canadian dairyman will rise up as he ought to, he can set resolutely to work and in three years can have a better cow ; and then, treat, handle and feed her according to the deductions of the best judgment of modern dairying. (Applause.)

A VOICE.—I would like to ask what kind of stock you would like to-ask what kind you would introduce for the purpose of making butter.

MR. HOARD.—The question that is asked is a hard one to answer. My friend, it is pretty nearly the same as if you were to ask me what sort of a woman a man ought to marry. (Laughter.) It is a good deal a question of taste. A man may have a peculiar taste, and he succeeds very well generally if he follows his taste ; but there is a certain line of distinction which, I think, should be adhered to. Men should select a breed of cattle in the line of that which they wish to do. Now, if men are making butter, or making cheese, they need good milk ; and whether handling Jerseys, or Guernseys, or Holsteins, I would always discard any one of them as a breed if they did not give me good milk, and I would know whether they gave me good milk or not. If one is adhering thoroughly to butter production, it is altogether likely that the Jersey, or the Guernsey cow is a breed that will give a larger production of butter-fat, for the feed consumed, than almost any other. There are families of Holsteins that are very superior in the daily production of either butter or cheese. There are other families which are nearly worthless. There are families of short horns that give a large return. Now, you cannot make a rule here. It needs that distinct judgment on the part of a man to guide himself in this particular. My own preference I have no business to give. That is the same as I exercised when I married a certain woman ; and I didn't marry her in order to please anybody else except ourselves. (Laughter.) I want to add that we must get out of our notion—that there is a butter cow and a cheese cow. There is no doubt, there are certain cows more profitable for cheese-making than they would be for butter-making, but we must get out of the notion that poor milk is profitable for either cheese-making or butter-making. Mr. Ballantyne told me, for instance, that when he was over in Scotland, while ordinary cheese there was selling for 43 shillings, some of the very best was selling for 60 shillings. He found the increased value was because there was about ten per cent. more fat in the latter. Now, the present system of cheese-making and creamery business encourages a man to make poor milk ; it puts a premium on it. That system must go, and men are coming rapidly to the conviction that milk should be taken into the factory and pooled, and every man get his dividend according to what he puts in. That system will come, and I think the nearest way to get at it, is a measure of the fat in the milk. A few of the factories are doing it in our State. The only men that "kick" are the men who cannot make a dishonest profit out of their neighbors. (Applause.)

THE SAME VOICE.—The reason I asked the Governor this question is because I have heard a great many say grades are best for milk.

GOV. HOARD.—I don't think grades are as good as thoroughbreds. It would be nonsense. But I think this, we have got to take the thing as we find it. Farmers can go and work a grade up, using a thoroughbred sire. We have to use the cow we now possess. If the cow we commence with is half-blood, the next should be three-quarters, and the next should be seven-eighths, and so the nearer we got to pure bloods in that direction the better. Now, don't go to work to crossing out. I know men who produce a lot of "hash." I heard a man jump up in our farm institute who had thoroughbred sheep, and who crossed Merinos and Shropshires and South Downs, and he said his sheep "Wa'nt worth a cuss." Mark the conclusion that man came to : he said, "I tell you that them thoroughbreds are confounded humbugs, every one of them."

WORDS OF ENCOURAGEMENT.

HON. JOHN DRYDEN, Minister of Agriculture, was then introduced. He said : It gives me extreme delight to meet with the members of this Western Dairymen's Association. I would feel like saying something about the nobility of this gathering had it not been for the remarks of the secretary, and I am almost afraid to do so lest you might think that I was a politician, and wanted to give you a little "taffy." Now, when a man in the position of your secretary, who has looked into your faces so many years, is struck with the gathering before us, you need not wonder at many of us being struck who see you for the first time; and I can assure you it has done me a great deal of good to sit on this platform and look into your faces. You used to be taught that we must expect wisdom from the east. I had the pleasure of attending the Eastern Dairymen's convention at Brockville, and when there I found a gentleman who had come from a place still farther east, in the Eastern Townships, and he said he had come up to learn wisdom; and while I was there I heard a gentleman whom I had heard named as your future president, speaking of the way you do things in the west, and ever since I have had a longing desire to meet with you and hear for myself how things are being done by you. Well, I am bound to say the further you go west the more wisdom you behold.

It is not that you have got wise men, but you have such a large number of them. It is not only that they come from the Eastern Townships to you to get wisdom, but have sent some of our men to the mother-land in order to teach some of them there your system of cheese making. According to the definition given by Prof. Robertson, when some one asked him what he considered a good Scotchman was made of, "He is a good Scotchman who keeps the Sabbath and everything else he can lay his hands on." (Laughter.) Now, these Scotchmen in the mother-land have laid hold of much of your system, and they are making such good use of it that now I find Mr. Ballantyne expressing some concern as to whether we are going to hold our own in that country or not.

Too much praise cannot be given to those that have made this industry what it is, but we must not forget that we cannot rest on these past laurels, and if we are going to make progress, you must have enterprise and ambition to do better than what has been done in the past. It will never do to stop where you are, and if new and better machinery and methods are discovered we must lay hold on them. I meet a good many who are real good Reformers in politics, and I like them firstrate, but somehow, as farmers, they are very stiff conservatives; and when I talk about the advantage of a silo they don't want to hear anything about it, because it is not according to the old plan. So to speak, they are like Old Aunt Peggy; they faint when anything like an innovation is mentioned. I have heard, when people did not make churches so comfortable as now, and it was proposed to introduce a stove into the particular church to which Aunt Peggy belonged, so that the people would not be obliged to sit loaded with winter clothing in order to keep warm, that Aunt Peggy objected. A good many thought it was objectionable, and it was a new thing and it was not a right thing. Aunt Peggy said: "It will get so hot I am sure I will faint right in the middle of the service." But notwithstanding her protestations the stove was put in, and sure enough when she passed up the aisles to her seat the next Sunday she spied this monstrous thing, and she actually did faint in the middle of the service. But she very soon came too; some one whispered in her ear: "There is not a bit of fire in the stove." (Laughter.) Now, there is no use of our fainting because some change is proposed. If you propose to hold the place of the best you must advance. You will need to have good cows and good feed, and mind to take care of them; and when all those things are complied with, I have great hope that the results will be that we will be able to hold our own, even with our good American friends who are able to give us so much wisdom.

Now, in all business there must be uniformity, and this must be the case with cheese if we are going to take the top place in the foreign market. It must be of as good quality as possible. If we have the best cheese I will guarantee it will make its own market. I remember going to the farm of Jas. I. Davidson, who deals so largely in cattle in this country, on one occasion, and saying to him: "Uncle Jim, that's a fine calf you have there." "Aye, is it," he said. I said, "You will be wanting a good deal for that?" "$400," he replied, "and the man is born that will buy it." So it is all around. I will venture to say if you can produce a uniform quality of fine cheese it will find its own market.

Now, every one of you—the cheese dealer, the cheesemaker, the farmer who produces the milk—has a double interest in this result. The man who is tampering with the milk and thinks the factory owners will never know anything about it is throwing down a boomerang which will hit him just as sure as possible, and he ought to get hit. But it is not that he is hitting himself only, but he is injuring all who send milk to the factory. I am perfectly certain of this. As most of you know, I have not been a dairyman, but I have come to this conclusion, that if we are to hold our own in regard to the manufacturing of cheese and butter we will need to go forward with the system of instruction and inspection we have had in the past. You will perhaps have to make the system more efficient, and that is one of the ways the Government may assist you. I think it is perfectly legitimate for the government of a country to assist in the dissemination of knowledge by which the people will be able to produce a better product than ever before. Some of you will have noticed that I have already struck out on these lines. I have struck out in this way with a view of giving the farmers the fullest information it is possible to give them. I believe I am right in that, and that all classes of the community will stand by the department while we are trying to do that work, because every class is equally interested in the prosperity of this great industry. As has been said this afternoon, agriculture is the foundation structure upon which all the rest is built.

Now, who is to give this instruction? Nothing has delighted me more than to find so large a number of the young men at this convention. And what are they here for? Here for instruction—that they may learn—and I think it is right, fair and proper that they should be given the fullest information that it is possible to give them. We talk about the future of this country of ours, and I believe we have a grand future for agriculture. But it is yet to develop. Who is going to do it? I say it is these young men into whose faces I am looking this afternoon. These are the men who are to add to the wealth of our country. Is it those dudes I meet in Toronto who wear tall hats and twisted moustaches and carry a cane about the size of your little finger? Not at all; but these young men who are here, the sons of the farmers willing to devote their attention and brains and intelligence to this grand work and noble calling of agriculture. These are the men who will make the agriculture of this country what it ought to be. I would like to take every one of them by the hand. I would like to say "Do not stand aloof from those who are not so intelligent as yourselves, but take your brother's hand and help him up to the same plane as yourselves and struggle together until you all reach a higher and higher plane." I assert everywhere that this calling in which you are engaged is one of the most noble in any country; but there is abroad a sentiment in the community a sentiment that it is a sort of mean thing to milk cows and be a farmer; that it is a sort of disgraceful thing, and that if a young man wants to be anything he must turn to some literary pursuit, or be a lawyer or a doctor. I would like to get away with such a sentiment as that. Now, I am not a very proud man, but I believe I shall involuntarily lift my head a little higher because I have been privileged to look these young men in the face. I believe, as I work in my Department, that it will make me feel a little higher and loftier than before. You won't blame me if I do.

I came here to listen, but I want to say before sitting down, that, as the head of the Agricultural Department in this province you have in me one who is your friend, one who sympathizes with you in your work, one who, so far as possible, will endeavor to aid you in any legitimate and proper way. You need not remain satisfied with your past achievements, but it is your privilege to move forward and forward, and if we but scatter the information we hope to do in future years we will be able to keep this province in the foremost place, which it has always kept in the past. (Applause.)

Mr. CHADWICK expressed his gratification with the remarks of the Minister, which showed that he was the right man in the right place. Heretofore he had always felt that all the assistance which might be rendered by the Government to the agricultural interests of the country had not been given.

Mr. JOHN GEARY, the new vice-president, was called to the chair in the absence of the president elect, Mr. Ballantyne. Mr. Geary acknowledged the honor shown him by his election.

A vote of thanks was tendered to the retiring vice-president, Mr. Hopkins,

AN EXHIBITION OF MILK TESTING.

Prof. **Robertson** said: In the course of my remarks last night and this morning I recommended cheesemakers to test cows as to the quantity and quality of their milk for cheese-making. The Babcock testing machine seems to make a test at very small cost. Mr. Robert Ballantyne, of Stratford, was good enough, at my request, to bring here a Babcock testing machine which they have, and I would like to have him show the farmers how it works. The total cost does not exceed one-half cent per test and the test can be made in four or five minutes. I think every factory should have a machine like this so that every man's milk could be tested each morning, and then no one could be dishonest and we would be bound to get better cheese.

An exhibition of the practical working of the machine having been made, Prof. Robertson explained the principles of its working. First of all a small portion of milk, apparently representative of the whole sample, is taken in a pipette which holds 17.6 centimetres of milk. That quantity is put into one of these bottles in the machine and a small quantity of commercial sulphuric acid is measured in this small tube; that is, put with the milk. Then they are skaken together. The mixture is then put in the bottles into this small drum, which revolves on the centrifugal principle, the idea being that the centrifugal motion will cause the cream to flow to the outside as the drum is revolved by means of this big wheel. Then, after the motion has been continued eight minutes, going 800 revolutions per minute, these bottles are taken out and filled up with water. The motion is then continued for 1½ minutes, and then you can read the per cent. of fat by the nick on the bottle, and this one reads now 3 3-5 per cent. fat in that sample of milk. By having two samples of the same milk you get a sufficiently correct test, and then you have a demonstration of the accuracy of a test to show to a farmer. The machine costs about $35 after the duty is paid.

A **Voice**—Can you tell whether the milk is skimmed or watered?

Prof. **Robertson**—You can only tell by this the per cent. of fat.

Hon. Mr. **Adams**—I wish to say just a word in connection with this test. I happened to bring along with me a record of 14 tests of 14 cows in my herd, made with this machine. We have thoroughbred registered Jerseys. I took samples of these cows, weighing and comparing them together 14 times, one way and another, and taking them up to the experimental station at Madison, and I got this list of percentages of butter fat, which I will read to show you the difference of value in the milk of individual cows:—

Cow No.	1	gave	26 lb. of milk	per day, averaging	4.16	butter fat, indicating	a butter yield per week of	8.96
"	2	"	24	"	4.44	"	"	8.82
"	3	"	17	"	4.87	"	"	7.14
"	4	"	34	"	5.28	"	"	14.94
"	5	"	22	"	4.38	"	"	8.12
"	6	"	29	"	4.57	"	"	9.94
"	7	"	30	"	4.51	"	"	11.34
"	8	"	20	"	6.39	"	"	10.62
"	9	"	25	"	5.04	"	"	10.50
"	10	"	28	"	3.75	"	"	8.75
"	11	"	36	"	4.57	"	"	13.04
"	12	"	27	"	3.81	"	"	7.47
"	13	"	26	"	4.28	"	"	7.77

Indicating an average butter yield altogether of 11.40. I found this surprising fact that some of the cows which had the largest per cent. of milk gave the largest per cent. of fat. That was in the month of July, about the 8th of the month, when the weather was extremely hot and the cows were upon rather a short pasture and received less than a pound of shorts per day—just a handful; and I found to my surprise that some of the cows which I did not suppose were very good were ahead. It occurs to me what a grand thing it would be for an ordinary farmer who has 10 or 15 cows, and does not know anything about the value of their milk, if he could send samples of his milk somewhere and have it tested by this machine. It costs but a mere trifle to have a test made, and if this were done farmers could work with some assurance that they know actually and positively something about what they are doing.

FINANCIAL STATEMENT.

The annual report of the auditor's was then read as follows :

To the President and Members of the Dairymen's Association of Western Ontario:

Gentlemen : Your Auditor's, appointed to examine the Treasurer's books beg leave to report that they have duly examined and compared the same with the vouchers and find them correct, showing a balance of $222.54, for which the treasurer has presented his marked cheque.

The following is a statement of the receipts and disbursements for the current year:

Receipts.		Disbursements.	
Balance on hand	$556 16	Expenses of Convention	$200 29
Proceeds of Convention	121 00	Salaries	246 00
Proceeds of Bills Payable	781 26	Printing and postage	75 24
Contribution from T. Eaton & Co.	5 00	Sundry accounts	24 85
Government Grant	2,000 00	Cheese inspector's	1,775 00
Receipts from Factories	255 20	Board meetings	94 75
		Bills payable	800 00
		Expenses deputation to Ottawa	80 00
		Grants to Exhibitions	200 00
		Balance on hand	222 54
	$3,718 67		$3,718 67

All of which is respectfully submitted.

John Robertson, } *Auditors.*
J. S. Pearce, }

Dated January 22nd, 1891.

A LETTER TO PATRONS.

Mr. Samuel Howard, was requested to read a letter which he sent last summer to the patrons of the factory where he was working. He said : "There is one thing I have been impressed with ; that is the necessity of proper instructions to patrons of factories as to the care of milk. I had been accustomed to send them bulletins which Professor Robertson got out from time to time at the Experimental Farm, and found they did a great deal of good ; but these were becoming a little stale because they came from the Government Farm, and for this reason, I thought I would write this letter. I had written several times before in an encouraging way, and some of the people took note of what I said, and governed themselves accordingly ; but some of the patrons were continually sending milk in poor condition. The following is the letter :

PEOPLE'S CHEESE FACTORY.

Gorrie, August 16th, 1890

Dear Sir : I take this opportunity of thanking all the patrons of this factory who have tried to care for their milk to the best of their ability. I may say that I know who the successful ones are, as well as state that I believe without a doubt the reason why some of the milk sent to the factory is not so good as it used to be is because a number of the patrons either don't know how, or are too careless, to properly clean, scald and air their cans after the sour whey has been returned in them. I therefore ask all hands to try and have the whey emptied out as soon as it has been returned, and throw a pailful or two of cold water into it till noon if you cannot have boiling water conveniently before then. Make it a practice to have a large pot or kettle full of boiling water ready for the purpose of thoroughly scalding your cans after they have been thoroughly scalding your cans after they have been properly washed. When washing it is a good plan to take a handful of salt and a damp cloth and scour the can well, seams, corners and all. Then, as I said before, have your water at the boiling point, and let me tell you that you might just as well try, if you were dressing hogs, to get the hair off clean without boiling water, as to try and get the acid taint out of the tin with water you could put your hands in. You know how the former would work. Well, having your boiling water ready, pour it into the can all around the top and put on your cover and turn the can on its side on a bench or clean board and roll it over a few times, then empty out the water and leave your can on a bench, or saw-horse, or somewhere to air till milking time, out of reach of the ducks and turkeys, and, need I add, little pigs. For if some people who think their milk is pretty clean saw it as it is emptied into the weigh can they would probably be astonished to see what I call, for want of a better name, a "ground hog." I have seen the dirt as much as two feet long from the time it would head out till the tail would slip over the lip of the can ; and more than that, I have also seen the nest sometimes. If there is one, you will generally find it located near the centre of the bottom, on account of the motion of the milk, and it is usually composed of earth, or something of that nature, which would be more profitable if it were put on the land than if sent to the cheese factory. I must say, however, that there are a large number of the patrons send their milk free from anything of this kind, and have it also well handled in other respects, and can be counted O.K. everytime. And why not all ? For, if I put one hundred pounds of milk that has been tainted with gas from want of proper airing, or that has been polluted by being put into a can that has not had the acid taint removed by boiling water, or has been tainted by the breath of ground hog, into a vat containing five thousand pounds, it will affect the whole mass, for it is something like the leaven that the woman took, that we read about in the Scriptures, and put in a quantity of meal till the whole was leavened.

I would also ask you not to allow your milk to stand outside in the cans when the nights get cold in the fall, but aerate then the same as you would in warm weather, and leave it where the temperature won't fall below 50 degrees Fahr. Milk that has been chilled acts much the same as yeast the ladies set for making bread if it gets too cold ; and trying to make good cheese out of frozen milk is like trying to make good bread out of frozen wheat flour. I am exceedingly anxious that the cheese we are now making for the fall trade be of the finest quality and free from whey flavors, as this is most objectionable in cheese for the English markets. It can be easily avoided if all hands will but follow the valuable instructions contained in bulletins on the care of milk by Professor Robertson, which I sent you all. It will also help if you tack up this circular where you can read it frequently, and educate your servants therein, as well as teach these rules to your children, and to your children's children, for they are good, and if put into practice each day we shall have no fear of results.

I also give you all an invitation to come to the factory and see your product handled. Remember, it is your factory ; so come along whenever you like, and walk right in without rapping and find out whether we are attending to business or not.

Your obedient servant,

SAMUEL HOWARD.

REPORT OF COMMITTEE ON RESOLUTIONS.

Mr. J. M. BUTCHART, read the report of the Committee on Resolutions, as follows, which was adopted at a later stage of the convention :

Resolved.—That it is the voice of this Convention that cheesemakers should have in every county where the cheese industry is concerned, co-operative organisations through which they could work in harmony, and facilitate matters of reform, and that they should send annually three delegates to this Association. Also, that the secretary of this convention issue circulars to all factorymen and cheesemakers, calling them together at some central point in each county for the purpose of organising. Cheesemakers and factorymen in the different counties should send in their name and address immediately to the secretary ; also suggesting some competent person to take charge of the meeting.

Resolved.—That the convention believes that it would add to the interest of the Dairymen's Association for the secretary to issue annually circulars to all factorymen requesting them at their milk meeting, to appoint three or more delegates to attend the Association's annual convention

And also, we recommend that some method be adopted that the cheesemakers and patrons could meet at their factories or some central point monthly, to talk over the care and proper handling of milk, to assist the cheesemaker to produce a better quality of cheese.

A VOICE—The question of dairy schools was referred to this committee on resolutions, but they have not brought in anything in regard to that subject.

It was stated that this matter would be dealt with in a separate resolution.

The convention then adjourned.

EVENING SESSION.

INSPECTORS AND INSTRUCTORS.

Mr. **John Robertson**, sr., gave an address on the above subject. He said: I wish simply to give a few thoughts on the inspection of milk and the instruction proper to be given to cheesemakers, and that opens up a very wide field. I thought in order to bring that subject before your minds in an intelligent, attractive and instructive manner it would be best to look at the question from three different standpoints, to see if we can find the necessity for inspecting milk and for appointing instructors, and if we can find that there is a real necessity then it will be for the meeting to try to devise the best plans, and adopt the best methods to meet that necessity. I thought, to condense my ideas, we would first take a view of the cheese trade in the country fourteen years ago, and, in the second place, make a little *resumé* of what it was four years ago, and, in the third place, make a *resumé* of what it is to-day.

Now, in the first place, we have to go back to what the cheese trade was fourteen years ago. Fourteen years ago our Canadian cheese was selling in the Scotch and English markets from fifteen to forty shillings a hundred weight, or less money than the higher Scotch and English cheese were selling for. When men began to study the business and put thought, and will, and power, and purpose into practice, then we began to creep up and creep up, and kept improving, until four years ago our finest fall cheese was just about on an equality with their Scotch and English cheddars.

Now, where are we to-day? The difference in the value of fine cheddars in England and the same in Scotland and ours is nearly as great to-day as it was fourteen years ago. To-day in England their finest cheddar cheese is selling at seventy up to eighty shillings, and a very common price for fine English cheddars is from sixty to sixty-two shillings, and the same for Scotch cheddars. The great bulk of the summer cheese that has been sold in the Scotch dairy counties in the last three months has ranged from sixty-two to sixty-nine shillings. What has been the range of our Canadian cheese? It has risen from forty-nine until to-day it is at from fifty to sixty shillings. It is not that ours has deteriorated either in quality or in uniformity, but it is because the Scotch and the English have gone gradually away ahead of us until they are now as nearly as far ahead of us as they were fourteen years ago.

Now, what are we to do? Are we going to stand still and allow them to take our best young men to improve their produce, and get all they like to ask for their fine produce and leave us to plod away in the cold and do the best we can? I misjudge the temper of the young cheesemakers of this country if this is to be the way. I think there is energy and brains enough in our young cheesemakers who are rising to overtake the Scotch and English yet. But you know this, that lost ground requires a double effort to overtake those who are ahead of you. Now, if we have got a long way behind there will be a greater need for more energy until we overtake them. In a race the object is not simply to overtake the ones that are leading, but to pass them. Let us get this idea into our brains, that if young men have gone from Canada to do what has been done there, could not the same young men or their equals, do the same thing here. Can it be done or can it not be done? I believe it can, but I believe it won't do itself. I believe it will take a good deal of talk and hard work, both with brains and hands, before it will be done, but I believe it can be done.

Now, if it is to be done, where are we to begin, or what are we to do? I am simply throwing out a few thoughts that you may take hold of them and discuss them. You have heard a good deal to day about beginning with the cow, but I would prefer beginning with the man; and if you get the right form of man and get a man that is sound on the dairy question, the man will soon begin to put the cow right, and after that the manufacturing right, and that will put the markets right very soon.

Now, I find that the question of profit in dairy cows is only beginning to be thought of. It is a matter that is simply in its very infancy—the real thinking of and working out where and how the profits are made out of the dairy cow; and to bring that thought before you just in a few moments: You all know of the competition in London a year ago, and in Toronto just last summer, brought about by the prizes offered by the late lamented Mr. Weld for the cow that gave her owner the greatest profit on the milk she produced from the feed that she consumed. I think no one will be prepared to question the correctness of the tests that were made; but the way they were published did not make it very clear to my mind that an ordinary farmer would be able to comprehend or gauge the point where the prizes were made. A very strange point that comes out about it was that the cows that got the 3rd prize were actually the cows that gave the most milk. The ordinary farmer would say, there has been some gouging about that somehow or other. Another thought I want to give you is that the cows that got the 3rd prize gave the best and richest milk. I have been to the trouble to work out the figures and I think I am able to explain to you how the cows that gave the least milk got the first prize, and how the cows that gave the best milk got the 3rd prize. The secret was not in the quantity of milk or the quality of milk, but in the way in which the cows were fed. There is where the whole secret of the thing comes in, and if you will just be careful enough, or take interest enough in it, either to take a note of it or to take it into your brains you will think the case remarkably strange. The cows that got 1st prize were daily given 3.80 pounds of bran, 2.02 pounds of ground pease, and 1.10 pounds of ground corn, which was 6.92, or nearly 7 pounds, of grain food. In addition to that they had 22 pounds of cut corn stalks with the ear on the stalks, and 1 pound of hay. The total was 30.14 pounds, weight of all food consumed by each cow per day, and the food cost 9.30 cents, or a little over 9¼ cents each day. It was because that man fed his cows nearly a half cheaper that gave him the prize. The 2nd prize cows were fed with 4.03 pounds of bran, 4.33 pounds ground oats (that gave them 8.36 of grain food) and 12 pounds of hay; altogether 20.36 was the total weight of food which they received, at a cost of 12.02 cents per day. Then the 3rd prize feed consisted of 7.10 pounds of bran, 7.10 pounds ground pease, and 6.66 pounds of hay, which gave a total of 20.86 as the total weight of feed which cost 14.26 cents, or a little over 14¼ cents per day; and the reason why that man was put back to the 3rd prize was because his cows cost so much to keep. Now, to give you an idea about the quality of the milk. It would have taken far too long a time to have read the figures over, and figures are dry reading; but for the 1st prize the average was only 4.08 per cent. of butter fat; that was for one day; the average for the next day was 4.39, and the average for the next was 4.83, giving an average for the whole test of 4.43. Now, a good many people don't know what that would mean; but it simply means that out of every 100 pounds of milk there was 4.43 pounds of butter fat. Now, the butter fats were valued at 16½ cents per pound. The casein and other solids were valued at 2½ cents per pound. So they were all valued at the same value, and the food was valued at the same value. They were all treated alike, and each man was alowed to feed what he chose. The first were Jerseys and the second Devons. The average yield of butter fat of the 2nd prize cows for the first day was 3.99; for the next day 4.28; and the next 4.70; and their average was 4.32. So that you see their milk was not so valuable—did not bring so much money as the 1st prize did, and then they were fed at a cost of nearly 3 cents a day more for food. Then the 3rd prize cows were another lot of Jerseys which gave far the richest milk of any. The first test gave 5.34 butter fat; the second 5.58, and the next 5.19, or an average altogether of 5.37. Now, the next point I want to give you is this—it was the profit on the milk that counted in winning the prizes. The 1st prize had $1.10 of clear profit out of the milk produced after paying for the food consumed; the second had 95 cents of clear profit for the milk after paying for the food consumed, and the third had 48 cents profit after paying for the food consumed. You see where the food counted in winning the prizes; it was the feeding that did it entirely. One thought that struck me was this—what ration of food made the greatest difference? The 1st prize cows consumed 22.22 of corn with the ears on it. You see the difference in the price of the corn with the ears on it and of timothy hay makes nearly the difference in the price of the hay. The grain feed of these cows was bran, pease, and ground corn; of the second bran and oats ground, and of the third bran and pease alone and hay. Those were the different rations, and you can take that with you and experiment just as you have a mind to. The milk and the cows were under supervision. The milk was tested by chemical tests by an assistant of Mr. Macfarlane, the chief analyst at Ottawa; so there were no chance for underhand work. You see how much difference comes in between the breeding and feeding of cows, and again in getting a good profit or a less one just owing to the care or management of the feeding.

The reason why I took up this subject to-night was that, in order to make more money out of our dairy and in order to improve the quality of our dairy the first thing that has to be considered is cheapness of production of the raw material. You know the man in business who can get equal quality of raw material ten per cent. or even five per cent. cheaper than his neighbor is going to outrun him, and it is going to be just the same with dairying. Don't you think that man who bed his cows at a cost of 9¼ cents a day is going to make money far faster than the man whose feed costs him 14¼ cents?

Now, that brings us to the question, how are we to regain our lost ground, and how are we to overtake the Scotch and and the English cheesemakers in their own markets? In order to make this all clear to you—because you are all interested in the cheese business—what have been the special faults and defects, during the last season especially, that have been telling against us? I am not in a position to say very much from personal knowledge, but I am told that in the fore part of the season there were two things about Canadian cheese that tended to reduce their money value very much; and one was that they were too stiff and too hard, and when cut and laid upon the counter they were apt to open up and show little cracks and a rough face. They were not a cheese that is meaty, or that will cut close, and solid and sound in every way.

Hon. Mr. Hoard.—I would like to ask what it is, in your estimation, that causes that fine cracking?

Mr. Robertson.—Well, it is a most important question, and I do not know that I am able to answer it with perfect confidence that I am right, but I can answer to a certain extent what helps to make the cheese crack. If you use too little rennet in setting your curd you will always have a cheese that has a tendency to be a little long in the fibre. One man, who told me he was troubled with his cheese cracking, said he used 2½ ℔. of rennet, and I said "I would just double it and use 5 ℔, but you are perfectly safe in using another pound, or in using 3 ℔. anyway," and after doing that he was not troubled again. I know if you don't use plenty of rennet you will always have a cheese that is liable to crack when exposed to the air.

Hon. Mr. Hoard.—I want to know if you do not think they crack because they have been dried out?

Mr. Robertson.—If they dry out it is because they never had enough contracting power from the use of rennet. My experience is that if you use little rennet you will always have a cheese that has a tender body, rather a weak body, and a different kind of a weak body than a cheese that has plenty of rennet but not enough salt.

Hon. Mr. Hoard.—It seems to me there is another line of thought of some service in that connection. I don't know but you may be right, but it seems to me as if those cheese were season checking; they shrink because they lose moisture.

Mr. Robertson.—The cheese I was speaking of began to crack almost as soon as they were put on the shelves.

Hon. Mr. Hoard.—You state that down the face of the cut they checked and dried out. Now, I have discovered that a skim-milk cheese will always check more than one that has plenty of fat. Then the more fat there is in the milk the less rapidly the cheese dries out. The necessary moisture is retained by the aid of the fat, and the two operate together and keep the texture closed. That has been my observation, and I want to know whether there was not a deficiency of fat in your cheese the past summer? What was the state of the pasture? Did you have considerable rain?

Mr. ROBERTSON.—Yes.

Hon. Mr. HOARD.—Well, now you would have less solids in your grass. As a rule might it not have been the case that your milk ran a little lower all through last summer?

Mr. CASSWELL —I would like to ask one question. With your experience in the Old Country, did you use more rennet there than here?

Mr. ROBERTSON.—We used more rennet, but another thing you have to take into consideration is that we set lower.

Mr. CASSWELL said it was the feeling of the meeting that Mr. Robertson's son, who had been an instructor in Scotland during the past season, should get up and give his experience to the Convention. The question is that the cheese dries out very much here. It is a disgrace to put cheese on the counter, which cracks all over its face in three days. I want to ask young Mr. Robertson, did they use more or less rennet in Scotland during the past years than we do.

Mr. ROBERTSON, jr.—Just about the same quantity.

Mr. CASSWELL.—Then I want to know why it is that the Scotch and English cheese don't crack and that Canadian cheese do, and that when you go to a store in the old country and get a piece of cheese and take it home and toast it you can leave it until cold and it is nice and soft; but in Canada if you toast a piece of cheese it is soft and nice for a few moments, but after it dries it is as tough as a piece of leather?

Mr. ROBERTSON, jr.—I find a great number of cheese do crack in both cases.

Mr. CASSWELL.—When all the cream is supposed to be left in?

Mr. ROBERTSON, jr.—No; when all the cream is left in they do not. But I think too much of the moisture is gone in cheese of the description of which you speak. You will find it invariably crack when the milk has been skimmed. Then, when cheese is cut it is always more or less apt to lose moisture. Too much moisture does evaporate in this way.

A VOICE.—Don't you think it goes too cold to press? I have noticed in the factories checks in the side, and in most cases they have acknowledged that it got too cold to press that day. Don't you think the temperature regulates the moistness of the cheese?

Mr. ROBERTSON, sr.—The handling has a great deal to do with the moisture.

A VOICE.—I think too high heating has something to do with the cracking.

Mr. ROBERTSON, sr.—Governor Hoard says skim-milk cheese always does crack.

Hon. Mr. HOARD.—That the presence of fat hinders evaporation.

Mr. ROBERTSON, sr.—That is one point on which he is perfectly correct, but one reason I claim why cheese gets short and cracky is because the milk is too old and too far developed and comparatively acidy when made up. I have seen skim-cheese that instead of cracking or being tender were thought tough in the hide. There are other things which will make cracky cheese besides that; and here is one point I want to get you at, that when you try experiments only try one thing at a time. There are a great many cheesemakers who will try two things at a time. If a cheesemaker is making too sweet he will ripen more and get more acid and add a little more salt and go a little too far the other way, whereas he might have found out what was wrong by trying only one thing. The next point I wish to mention is that in our cheese there was a lack of that creamy, pure, nice flavor which some people call the "rosy flavor," which is so seldom secured in Canada during the first three or four months of the season. I thought that was just what put our price below the English and Scotch cheddars. Now, apart from that, I will give you one reason which, I think, has a great deal to do with cheese cracking when it is cut. As a rule during a good part of our season of making you are troubled here with gassy curds. I never saw a gassy curd all the time I made cheese in Scotland, during thirteen or fourteen years. They tell me they have it there occasionally a little. If you have a gassy curd you are under the painful necessity of treating it in a different way than an ordinary curd. It has to get more working up, and has to be turned oftener, and for that very reason the curd is drier and stiffer and harder, and it would not hang together in a solid mass if it got less handling. Now, if we could avoid that and get the flavor that the Englishmen want and give the cheese the style of appearance they ought to have we would be on a level with them on the market. How are we to attain that? What steps are we to take in order to reach that point? You have had the subject of dairy schools brought to your notice. So far as instruction and inspection and dairy schools are concerned I think "both would be best." But one difficulty to my mind with the dairy school is that we cheesemakers, under present circumstances, and with the demands that are now made upon us, want something that will help us up more quickly than the dairy schools will do. We want something that will help us this coming summer; we want something that will enlighten and enliven our cheesemakers at once. Now, what is the best thing to do.

Mr. Casswell—Send good milk to the factory.

Mr. Robertson—Well, that is all right. We have been trying to get cheesemakers to make each cheese factory like a little dairy school, but we know the effects of this. During my experience last summer I found 100 out of 140 samples of milk watered. Then I found 4 samples out of every 100 some how or other short of cream. Now, that is not a great many, but still 4 in 100 is always something and it is tending in the wrong direction. You are able already to judge as to the usefulness of instructors and inspectors, and that is why we want to bring these things before you. We don't want to force anything upon any man, but we want you to judge from past experience what has been the benefit to you of this system of instruction and inspection. We want to put it in this way: have you found that the testing of milk in the past has been of any benefit? and, along side of that, has the work of instruction, by which we endeavored to assist you, been of any benefit to you? It is just like this to my mind: if these two things have been of no avail in the past then we don't want them continued and we want something that will be a benefit. Now, I wish the meeting to answer these two questions.

Mr. Hopkins—I am not going to say but that the inspectors in the past have been of service, but I think they could have been a good deal more serviceable. I think I can tell where they failed in a great measure. We expected reports from those inspectors and the reports which they left us never proved satisfactory to us. They were never definite enough, so that the great difficulty was to base a case upon the reports that we might bring before the tribunals. The report was "Well, pretty fair," "Not so bad on the whole;" the milk was not "watered," or "skimmed."

Hon. Mr. Hoard—But you had no standard!

Mr. Hopkins—But we profess to have a standard.

Hon. Mr. Hoard—The measure of fat as a legal standard?

Several Voices—No, no.

Hon. Mr. Hoard—Consequently you are in a fog.

Mr. Casswell—Some of the reports were very definite, you must admit?

Mr. Hopkins—I say upon the whole they were not. I know that Mr. Robertson called on me and we had a meeting and a very good night of it. I believe perhaps in that way, the instructions might do good—by bringing before the patrons the necessity for cleanliness and the importance of taking care of milk—and I believe we did derive benefit in that way. But what I am speaking about is that we got into a fog when we undertook to bring people to time. In this vicinity the inspectors reported that there was such and such a percentage of watering and skimming, but when we came to think of prosecuting or getting remuneration for the loss we sustained we had to abandon all the cases. We have got to give an education to our patrons. We bought sixty aerators this year and we can hardly get the patrons to take these and put their milk through them. We have got to commence at the patrons themselves; show them the defects in a certain amount of milk which they give us. We can make prime cheese, of fine flavor, all equal aged cheese, if they give us equally aged milk in good condition.

Mr. **Robertson**—To bring my remarks to a close, in reply to what Mr. Hopkins has said, no doubt there is quite a lot of truth in it, but so far as my reports were concerned, I do not think I put my name to them, but I had figure for figure for what I said. It is true we must have perfectly pure milk to make perfect cheese. It is true what the Old Book says, "You cannot bring a clean thing out of an unclean." Now, while Mr. Hopkins has said that the reports were not very definite, I have also found boards of directors connected with cheese factories that were not very definite either. (Laughter.) I have left reports stating that milk had been watered 15 to 20 per cent. and that I could swear to it, but those men did not think it would be wise to stir up feeling in the neighborhood. (Laughter and applause.) In order to reach the farmers we want to get at the cheesemakers, and I only get the cheesemakers when I go to the factories. I can honestly say that, for the last fifteen years, with but one or two exceptions, I scarcely ever got an unkind word from a cheesemaker in Ontario, and I have found fault with them and lectured them, and have gone into the curing room and shown a cheesemaker the defects and told him how to avoid these, and the next time I went back he would take me by the hand like a gentleman and say, "I am glad you found fault." I don't believe there is a class of men under the canopy of heaven that are more interested in their business or would like to do right more than our Canadian cheese makers. Get them educated and let them talk these things over with the patrons. Then the next thing the cheesemakers should have is a great long sheet on which to keep a record of the milk and if any man brings tainted milk tell him it has got to go in the whey tank or home, and stick to it. Then you will get clean milk and a clean market and it will enrich you all round.

Mr. **Casswell**.—I understood you to say they welcomed you?

Mr. **Robertson**—They almost invariably did.

Mr. **Casswell**—Did not some of them "Go for you" and kick up a row when you told the truth?

Mr. **Robertson**—Mr. Casswell is at the wrong point. I was referring to cheesemakers, not to patrons or directors.

Hon. Mr. **Hoard**—I want to ask young Mr. Robertson a few questions which I think will throw a little light on Scotch cheesemaking. Do they have in Scotland this promiscuous way of bringing milk to a factory to be manufactured as we do here, or is it not true that the finest Scotch cheese are made in large dairies of 100 or 200 or 250 cows?

Mr. **Robertson**, jr.—The milk is produced on the one farm, but the cows range from 40 up to 240. I daresay a great many of them have about 80 cows.

Hon. Mr. **Hoard**—Does not that eradicate a certain factor of badness? They have the question of the milk production well condensed, have they not?

Mr. **Robertson**, jr.—Yes.

Hon. Mr. **Hoard**—Consequently they have no miscellaneous milk to deal with—as miscellaneous as the old woman said her descendants were. (Laughter.) She had four daughters and one married a darkey, another a Spaniard, another an Irishman, and the other somebody else—like enough a Yankee—and she said she had the "speckledest lot of grandchildren she ever did see." (Laughter.) Now, just stop a minute, you cheesemakers, and think a little. You have so miscellaneous a character of milk and men to deal with that that introduces a disturbing character in the final quality of the cheese. For instance, give me a 45 cow dairy and I control the milk, give me a 50 or 100 cow dairy, I can make finer cheese than I can if I am bothered with 50 or 100 dairies that I cannot control. Then I would like to know what is the ruling character of the water in Scotland. Is there a likelihood of their having purer water than we have here?

Mr. **Robertson**, jr.—Yes, I believe there is.

Hon. Mr. **Hoard**—There are less mud pools and dung holes, etc. Now that is a most important thing, for bad water has more to do with stinking flavors in milk than anything you have to deal with. I have traced the taint in cheese from the factory to the pond hole where the cows stood in the summer time and drank the water contaminated by the droppings of manure and urine and everything else. If you examine that milk with the microscope you will find in it the same germs as in the water. Then show this to the owner of those cows and say to him that he is endangering everything. Now, that is one thing we ought to do in Wisconsin and Canada from firstly clear up to seventeenthly. Now, another thing. A young gentleman spoke about skimming, and said he saw in *Hoard's Dairyman* a recommendation to skim to some extent, because cheesemakers could not incorporate all the fat. Well, it is true they don't all the time; we may just as well take some of the blame to ourselves as be loading it on to some other body all the time. I often go into factories and see fat wasted even in handling poor milk when there is none of it to spare. I know it is hard to incorporate this matter, but it only requires skill. The point made in the *Dairyman* was this: We need a standard; every man is working unto himself. Suppose we put the standard at 40 per cent.; that will give you, allowing for wastage, about 35 per cent. of fat in every hundred pounds of cheese. That will make you a clean cheese if it is skilfully made. But we have here, for instance, the talk of more and better cows and incorporating more and richer milk. Now, the question is the matter of skilful making, for skill is money. Supposing I have milk brought to me that has six per cent. fat and it don't pay to incorporate more than four per cent. of the fat? That was the idea that was brought out in the *Dairyman* concerning this question of skimming—the question of taking the milk down to the standard. Another thing is the question of reaching these patrons. Let me suggest to you that we have got to reform our methods a little. Why don't we consider the cheese factory more of a dairy school than we have done? Why do we waste this whole winter doing nothing? There is a cheese factory, there is a curing room, there's a stove in it, there is an opportunity of getting the patrons together. Why don't we take advantage of these little school houses dotted all over Canada and the United States? Let me say it would be very foolish to have a school house and never get anyone into it. You are standing in your own light. You ought to get your patrons together. You ought to do something in this line to inculcate a taste for dairy reading and dairy study. You should call your patrons together to discuss this question. They don't believe what you say, I know they don't, for they tell me so. They say "Them cheese-making sharps, they talk a great deal, you know, but talk is cheap." Get these men together every winter, do it even in the cheese-making season, if you can. Discuss this question with them. Go to work and read out something yourself as to the effect of these things. Write to some one and ask him to send you a statement as to what is the effect of bad water upon the milk for cheese-making purposes. Those men are ignorant of the conditions of these matters, and you have done nothing although you are dealing with men who don't come to conventions and don't read dairy literature and don't make a study of these things. Why, it is a good deal as the boy said when his throat was swelled up, "The stomach was awful hungry for water, but the throat wouldn't let it get there." The market is hungry for good cheese, but ignorance won't let it get there. I believe that the system of inspection is a good one, but I want to tell you one thing, that in Canada you have not started right yet. In Wisconsin we have started right, but we want to make a little different change in the rightness of the right. We want a legal standard for fat in milk. We started at three per cent. because the farmers said "Deal with us gently." But now how simple is our work. Our dairy and food commissioner goes to a factory and takes samples of milk. The man that brings milk to the factory that has less than three per cent. of fat catches it. It does not depend on the directors or cheesemaker to enforce the law. The dairy and food commissioners make the law and enforce it. Now, you have a legal standard to start with. It is a great help in pushing things up. Let me show you: Some factory owners are contracting to return a pound of cheese for every ten pounds of milk.

Hon. Mr. Adams—They ought to be closed up.

Hon. M. Hoard—Why, they are out in pocket and everything else.

Mr. Symington—What is the standard for solids?

Hon. Mr. Hoard—We have no standard for solids, because no one can steal solids.

Mr. Symington—Are the solids all there in poor milk?

Hon. Mr. Hoard—No, everything is low in poor milk.

A Voice—What is your opinion of pooling milk and paying everyone according to the quantity of fat?

Hon. Mr. Hoard—Well, you are coming to it. It is fast coming here. We have got to it.

Mr. Symington—Would there not be less solids if there were 20 or 60 per cent. of water?

Hon. Mr. Hoard—There is 87 per cent. of water in milk.

Mr. Symington—What if there were 20 or 60 per cent. of water added beyond that?

Hon. Mr. Hoard—We are not busying ourselves with that at all, because whether a man waters the milk or not the value shows in the fat, and if he skims it shows in the fat. He cannot meddle with the milk in any way. If the cow herself skims the milk it shows in the fat. Now, we are coming to that point where we will take 4 per cent. as the standard, and by using this little Babcock extractor be able to say to A, "Your milk has just 4 per cent.—that is, 100 per cent., you shall receive your pay accordingly;" and another man whose milk tests 3.75 per cent. gets his pay according to that; and if the fat tests above the standard he will get his pay then also.

A Voice—You are in butter-making?

Hon. Mr. Hoard—No, I am talking cheese-making.

Mr. Hopkins—Supposing my milk tests 4 per cent. and the standard is 3 per cent. Well, I say I will add 20 per cent. water and then I will have the standard. You find out that I have watered my milk and yet you let me go Scot-free because my milk is richer than another man's and I have only watered it down to the standard.

Hon. Mr. Hoard—We have a law against watering milk, but you have always to catch your rabbit before you can roast him. However, we have a standard. It is *prima facie* evidence against a man if the milk falls below 3 per cent. without any other analysis at all. You see the advantage of it. It simplifies and facilitates prosecution, but if a man can be caught or found watering his milk he is liable to prosecution.

Mr. Robertson—Supposing something occurred such as Mr. Hopkins referred to, and that a patron did skim or water his milk to bring it down in butter fat to a little above 3 per cent.?

Hon. Mr. Hoard—He has no business to skim or water it.

Mr. Robertson—No, but what can you do?

Hon. Mr. Hoard—Well, he should not do it.

Mr. Robertson—Would you allow it?

Hon. Mr. Hoard—I would, because you have established a system which leads to that very thing. A patron says, you are not doing him justice anyway and if you don't he will himself. You compel the man to pool upon an unjust standard and you have no right to compel him to accept the results of it.

Mr. Robertson—Allow me to give you a note or two here to let you see the different range of milk in my own experience this last summer. The poorest sample which I got only had 1.40 per cent. of butter fat in it; the largest sample had 5.60, and the men who furnished these samples were allowed and did continue to receive pay at the same rate. The one man was a great loser and the other was getting a great deal more than his own.

Hon. Mr. Hoard—That is just a difference of 400 per cent.

Mr. Robertson—I took the trouble to figure up all the tests I had made last summer, and the average of the whole of the tests I made—something near 4,000—was 4.1 per cent. for the whole season. The year before I tested something like 9,000 samples and the average was 4.8 per cent., so that the last summer, so far as I could judge, the milk showed a little less butter fat all through the season, until we came pretty near the middle of September, and then it struck up in some cases until October.

Hon. Mr. Hoard.—Well, that was a very good average, but I want to show you what this inspection has been doing. I tell you we had a foolish lot of cheesemakers who went into the business. They were seduced into it by the patrons. They went on cutting the sand from under their feet. There were those cheesemakers getting out of pocket until they were from $1,000 to $1,300 in debt. Finally they appealed to the Dairy Commissioner; he went and applied a test and found the quantity of butter far down to 2.50, and fined different patrons $30, $40 and $50. At once, within twenty-four hours, there was a marvellous reformation in the milk in the whole of the cheese factories. Now, we have your system of inspection borrowed from you. It has been doing our cheese a splendid amount of good. I believe that the work along this line is in the best possible shape. But you want good laws to underlie that system. There is nothing in the law that reinforces the pooling, and that is what we want to correct. I believe that the point we touched upon in the beginning is a very important one, with regard to the fat in the milk as regards the evaporation of the cheese. Now, to settle this, take a cheese that has 40 per cent. fat, made the same as another that has only 25 per cent., and see how much quicker the latter dries out. The fat does help to retain the moisture in your cheese, and the leaner your cheese is in fat I think it will show more of that feature of cracking as a rule. I think, my friends, coming back to that point of the reaching of the patrons, that the cheesemakers of every factory can well afford to take upon themselves, when they have more machinery and less labor than formerly, an effort to stir up their patrons. I can show you patrons in Wisconsin clear right up along side of the cheesemakers and buttermakers, who know just what the standard is and what they want to do. Now, it is a pleasure to do business with such men. To show you a little of the effect of this education upon your own business, in Chatauqua county there is an old German who has fifty creameries and 1,500 patrons, and he was talking about the education of those patrons. He said "The business is crumbling and what will I do?" I went home, and he wrote me a proposition. He said "I believe I will do something for these people. I find the difficuly is they are not posted on dairy thought. Thay have not been thinking or reading along those lines; will you send me so many copies of the Dairyman for distribution among them; I think I will send these papers to the patrons of two or three creameries." He took them and tried that plan for a year. What is the result? He said it was worth hundred of dollars to them. They began to take an interest in their business, to take better care of their cows, to get a great deal more milk, and to make more money. He said to me "As a proposition it was the best thing I ever did." I am not saying this from the standpoint of advertising my business, for I furnished those papers for absolutely less than they cost me. I wanted to see what would be the effect of education upon the men who made the milk. Now they are holding their own meetings in the creameries, and there has been a progress among these people that is very favorable.

RESOLUTION REGARDING INSTRUCTORS.

Moved by J. S. Pearce, seconded by H. S. Losee, and *resolved*, That this Convention heartily approves of the good work that has resulted from the employment by the Association of travelling instructors and inspectors, and recommends to the Government the desirability of making such financial provision as will enable the Association to carry on that work in a still more efficient and extended way. Carried.

Mr. Hopkins—I just wish to have myself understood with regard to the remarks I made when on my feet before. I am not opposed to inspectors, but I believe the cheesemakers are quite competent, and I think where the reform should commence is that the cheesemaker should test the milk. I think that meetings should be held in the factories to get the patrons acquainted with the nature of milk and that there should be a little combination among the cheesemakers. I would not have one combination for the county, because the factories are too far apart, but I say that the makers of four factories could combine, and let one of those makers be the leader and tell the best ideas in regard to the improvement of milk and the difficulties to contend with in its care. Have the cheesemaker inspect the milk. Then we want instructors to go from factory to factory, and where the cheesemaker has been a little wrong rectify his mistakes. An inspector can do more efficient work then, and he will not be kept at one factory all day. There is a difficulty about the inspector being the prosecutor. I have contended that the inspector should not be detained from other work in consequence of a prosecution. I think the patrons and the cheesemaker should attend to the prosecution. Then, I think every factory should be the same as a little school, as Mr. Hoard has said, where the cheesemaker will take the lead. Having got the inspection right, by every maker being able to inspect the milk, and the milk right, then we should have four or five men to go right through the factories and put the cheese right.

Mr. CASSWELL—Did I understand you to say the cheesemaker should be the prosecutor? Don't you think you would put the cheesemaker as a prosecutor in an invidious position? If the cheesemaker did his duty and inspected the milk as he ought, should it not be the managing director who should do the prosecuting, and not let all the blame fall on the poor cheesemaker? I may say that if the cheesemaker did the prosecuting he would soon be turned out, or else the patrons would not look at him.

Mr. HOPKINS—I did not say that. Just allow me to correct myself. So far as the test is concerned, although the owner of a factory, or the managing director, may enter the case, you must certainly at all times depend upon the man that made the test for the evidence to convict the patron.

Mr. CASSWELL—But would the cheesemaker prosecute?

Mr. HOPKINS—Well, he would really be the man who was prosecuting. You cannot get an inexperienced man to give evidence as to a test of milk. I would make the maker in every factory the prosecutor so far as the testing of milk goes. If necessary, you would simply furnish him with a subpœna as a witness.

Mr. CASSWELL—But you are well aware that where the inspector has written a letter to the directors showing adulteration they have not prosecuted. Now, I may say if they had taken up those cases and prosecuted the men they would have done the factory and cheese trade a great deal of good. I do not see that there is any use in the inspectors writing a report and then the directors declining to punish.

Mr. HOPKINS—Well, we have punished men. We have gone as far as we possibly could.

Mr. LOSSEE, referring to the resolution which had been moved, said: I advocate these county conventions. When those interested in the business in a county act together they can lessen the cost of manufacturing. We know for one thing there are three or four milk routes on every concession. That ought not to be. If the factories and patrons would act together they could lessen the cost in this way very much.

Mr. CASSWELL—Did you, Mr. Hopkins, buy testing instruments for all your factories last spring?

Mr. HOPKINS—Yes.

Mr. CASSWELL—Did they have a good effect or a bad effect?

Mr. HOPKINS—I know they were very tardy about using the testers.

Mr. CASSWELL—Did you insist upon them being used or not?

Mr. HOPKINS—We bought a tester and put in each factory and the cheesemaker was to test the milk.

Mr. CASSWELL—But did they do it?

Mr. Hopkins—I know we found the instruments. Whether the cheesemaker did his duty or not I don't know.

Mr. Casswell—But did the directors do their duty if they did not insist upon the tests being used?

Mr. Hopkins—Well, they passed a resolution demanding that it should be done. (Laughter.)

The Convention adjourned at 9.30 till Friday morning.

THE BANQUET.

A great many members, after the adjournment, repaired to the O'Neill House, where a banquet was given, jointly, by the Woodstock Town Council and Board of Trade in honor of the Association. His Worship, Mayor Douglas, presided, and the vice-chairs were occupied by Mr. J. M. Grant, president of the Board of Trade, and Mr. G. R. Patullo, county registrar, representing the school board.

THIRD DAY.—MORNING SESSION.

RESOLUTION RESPECTING INSPECTORS AND INSTRUCTORS.

The convention resumed at 10.30 on Friday, when Mr. Hodgson moved the following resolution, seconded by Mr. James:

> That this Convention desire the President and Directors of this Association to engage as soon as possible four (six if possible) competent cheese inspectors and instructors, such instructors to be engaged for the season, and being competent speakers, so as to attend the annual meetings of all factories possible, and giving the patrons of the factory any suggestions needed for the better improvement of our make of cheese.

Mr. Hodgson, speaking to his motion, said: I know from talking to Prof. Robertson that his idea is to have the inspectors engaged for the season. My idea is that if the patrons are met by a competent man every year so as to talk cheese over to them, we will get right at the commencement of our production. All heard last night what Governor Hoard said about the value of having meetings at the factories. I may state that the first meeting which I ever attended in this Western District was at the Sefton factory. A cheesemaker asked me to go down, and I went along with the reporter of the *Advertiser*, Mr. Thompson, and I think a great deal of good was done at that meeting. That is where really good work can be done. As to the last year we had no inspectors, and I thought I would give my ideas a practical effect in expressing the desire which I know has been felt over the whole section for their appointment this season. In the Belleville district, in some cases, this year, they have beaten you by a quarter of a cent per lb. Their cheese has been of a high quality, and I think mainly on account of employing inspectors. They have the same instructors year after year. The first year they may not be able to get acquainted with the workings of the different factories, but by two years work they get to know the factories better and do better work. As Prof. Robertson has said, I think the inspectors should be put under a close examination before being chosen, and by means of them I think you will get at the whole root of the evil in cheese making. You cannot crowd the English market out with the finest grade of cheese. What we want is uniformity, and I cannot see how dairy schools, or any system of schooling, can get uniformity of cheese outside of instructors; because they go around among factories and see who is going forward and who is going backward, and bring those that are getting behind up to those in advance, and so secure a uniformity of good cheese,

Mr. James James (Nilestown).—The employment of inspectors, I believe, is a step in the right direction. I have been for a quarter of a century trying to agitate this thing, and I am very glad the step has been taken in this way. I am pleased to second Mr.

Hodgson's motion. It has come from the right place—from a gentleman like himself, who is a buyer and knows the benefits of the system of inspection and the requirements of the market. We cheesemakers cannot get the patrons to act. We claim we can make cheese as well as any makers, but the thing is to get the milk in the right shape from the patrons.

Mr. THOS. LOCKHART (East Zorra):—Is the system of inspection going to be compulsory? Who supports the inspectors? Is it going to be done at the expense of the associaton or of the factories? Now, this gentleman (Mr. James) says he has been an advocate of inspection for a quarter of a century, but it is not very long since we had inspectors before.

Mr. JAMES—I advocated the system before the inspectors were appointed at all.

Mr. LOCKHART—Of course it has been acknowledged as a good thing to have inspectors. I am not a cheesemaker, but I am connected with a factory. So far, in the past, it has been voluntary on the part of the factory whether inspectors were employed or not. I suppose if they are appointed again only some factories will have them. If that is to be the case we cannot have uniformity. If it is going to be obligatory—if you clothe these inspectors with authority to visit these factories without invitation—then we might have uniformity. I suppose we could get an Act of Parliament to bring this about. We had one inspector before who if he did not do his work with a little more discretion in the future would not do much good. He came to the factory but did not complete his work. He made certain entries in his book implicating certain persons on one solitary test. These parties' names got out through the neighborhood, and several very respectable citizens vouched for their innocence in the matter. They got somewhat into disrepute in this way, and considerable feeling was aroused. In fact for a time I did not know whether the board was going to be indicted or not for it. I am afraid if the inspector had been in the vicinity then he would have got into trouble. Now, if you send an inspector around without consulting anybody he has certainly got to have a good deal of discretion or he is going to do harm instead of good. He is simply going to raise disturbance and impute improper things to certain parties. Taking a solitary case of poor milk, you know it may be accounted for on other lines than adulteration. If inspectors go to factories they ought to see that things are so managed that no one's character is blackened unjustly, because it sticks to a man, and certain parties will use it against him. I do not believe, however, that if we have a right class of cheesemakers we need inspectors; and I believe competition in trade will bring these to the front; and I still think cheesemakers are competent to do the work. I think the cheesemakers migh prosecute, from the fact that there are very few in any company who will resort to adulteration, and instead of making the cheesemakers unpopular it would make them popular. Speaking of the old inspectors, they are not more competent than some of ourselves. Some of our makers would not submit to their instruction very well. They feel they are competent.

Mr. HODGSON—If Prof. Robertson were here I think he would say that he wants inspectors, and I find the cheesemakers are the very ones who want the inspectors to go around to the factories. I think the board of directors we have appointed will see that they get good, sound, honorable men as instructors, and, therefore, in any such thing as interfering or disturbing the unanimity of the patrons, I think it is only borrowing trouble. If the men appointed are able to get at the source of trouble I think the makers will be only too glad.

Mr. JONES.—We wanted our cheesemaker to take it in his own hand to prosecute delinquents. He said, "No; I will if you pass a resolution instructing me to press the thing as far as the law will allow." We did so. A man who kept 9 cows we fined $25. Next month it happened again that he had been adulterating. He took off cream for butter. He acknowledged it the second month and had to pay $30. Our factory is not large, but we get good milk and can make the cheese.

The PRESIDENT.—It is not compulsory at all upon a factory to have an inspector. If they don't wish to have him they are not obliged to do so.

Mr. Fewster.—I do not think any good cheesemakers would object to having inspectors appointed. If so, let them speak.

Mr. Lossee.—There is no cheesemaker who would like to take that responsibility on himself. They are too glad to have some outside inspector inspect the milk, because they do not want to raise any disturbance themselves.

The motion was then carried.

DAIRY SCHOOLS.

Mr. Pearce.—I have another resolution which I think you will all agree with, with regard to following up this idea of Professor Robertson's :

Moved by J. S. Pearce, seconded by J. M. Butchart, and

Resolved.—That this association urge upon the Dominion Government the advantage and need for the extension of the work of the Dairy Commissioner by the establishment of branch dairy experimental stations, under the direct supervision of Professor Robertson, for the purpose of carrying on such investigation into the principles and practice of improved cheese and butter making during the winter season, by fitting up these stations for that purpose, in order to educate and induce the factories and farmers to go into this branch of industry.

Resolved further, that a copy of this resolution be forwarded to the Honorable Minister of Agriculture for the Dominion.

The resolution was carried.

Mr. John Robertson.—We hear it said sometimes that certain individuals have certain ideas always uppermost. and whatever they may talk about these things always come up. Well, I think if there is any one idea above another that has occupied my attention through all my life, it has been cheese ; and in connection with the resolutions that have now been passed, I think, there is a good deal of uncertainty about the purposes which both the dairy schools and the inspectors are expected to fulfil. The resolution, to my mind, puts the matter in its true light. It is not intended that the dairy school should be like a day school, where everybody might go to learn the business. They are simply to be experimental stations, where cheesemakers can learn a great many things that are still very dimly known, and many things that are not known at all, as to the character and chemical conditions which often arise in milk. They would simply be stations for experiment in all the unknown features of the business. That is very different from a dairy school where people are to go and learn their business. Now, the very discussion we had last night, about the various points of weakness, and the faults and what causes the faults, and what deteriorates the value of our cheese, shows the necessity for an experimental school. Then, as to the inspectors and instructors, the way they have been doing in Scotland is this : I think the government for the last two years paid one-half the expense of the society doing the dairy work. Then the members contribute so much, I think it is five shillings a year. They, the farmers who own the cows, are assessed about six cents per cow. You can easily see the correctness of the principle ; because, if a man had ten cows he would pay 30 pence, and if he had 20 he would pay 60 pence, and so on in proportion to the number of cows he kept. Now, you take an ordinary factory in this country, say one supplied by 500 cows, and if it was assessed at 3 cents per cow, that would be $15 which that factory would contribute, and the government grant added to it would be sufficient to pay for the oversight of that factory by a competent man as instructor and inspector during a season. I know that sometimes the factory owners and dairy farmers think $10, or $15, or $20 quite a lump of money ; but if you say to them, "Would you agree to assess yourselves at the rate of 2 or 3 cents for each cow whose milk goes to the factory," I do not think there would be half a dozen farmers in any neighborhood who would object. I would pay twice that my self if I was putting milk into a factory, just to know what my milk was doing, and to see that the milk was honestly managed all around.

Mr. Hodgson.—I would go strongly for making all the factories have the inspectors

Mr. Casswell—You cannot do that. We are not in Russia.

Mr. Hodgson, that is only a suggestion; but I certainly think the owners of every factory should see that if they do not allow the inspector to go to their factory they strike a blow at uniformity.

Mr. John Robertson.—There is quite a little truth in what Mr. Hodgson says, but I think the difficulty is one which time and experience would soon rectify. If you are so fortunate as to get the right men for inspectors and instructors they will in nine cases out of ten lift the factories under their supervision to a higher plane. There will be a uniformity in those cheese where the inspectors' services are regularly employed, that there will not be amongst the factories that do not take advantage of their services. The consequence will be, when it comes to a question of money value, the owners who do not at first employ the inspectors will then do so. It is sometimes difficult to know how to get at people's thoughts, but about the readiest way to get at my own, and it is probably about the readiest way to get at those of most people, is to get your hand into the pocket. In that way you will soon reach the brain. I believe it is as true in the cheese factory as in any business. There are some makers in the country that would be as good men and know as much as the instructors, but they are not available. I know men whom I could recommend as the very men to fill those positions if it would be any use, but you cannot get them. If a man is running a good factory and making fine cheese and his patrons and himself are working in harmony he has a permanent position and has got a sure income; and he is not going to leave it to take a position which is not quite so certain, nor so agreeable to himself. But the great idea of having instructors is to assist men in a friendly way who are not quite up to the top and to give them the benefit of further instruction and to encourage them in their arduous labour, and lift the men who are on the lower plane until we get them up to the top. All this cannot be done in a day. It took us six or seven years to lift our cheese up to near the price of Scotch cheese, six, eight or ten years ago. Now they have got beyond our reach again and it will take us maybe five or six years, with all our efforts, to reach them again, but it has to be done, although it will take a good deal of skill and brain work to do it; and neither brain power nor money power should be spared in doing it.

Mr. Hodgson.—I want to follow out the argument about this inspecting business. Who were the first last year? Were they not the persons who took advantage of this inspecting?

Mr. Casswell.—When Mr. Harris was employed we had a few applications for his services and we sent out notices that factorymen who required them would have to pay so much per day. What astonished me was that the factories which asked for the inspector were those which made the best cheese, and on account of the quality were able to obtain the best prices in the Old Country. In this section it is said the bulk of the cheese was not up to that in the northern section. They did not apply for the inspectors here. I think there were only eight factories here who applied and 48 or 49 up north. I know factories who stand above the average and need never offer their cheese in the market; and those factories were the first that applied for and got the services of the inspectors. It is said we ought not to charge the little factories as much as the big factories for inspector's services. It takes just as much time for the instructor to go to a little factory as a big one and teach the maker. Even if the inspectors did not do what they were expected to among the patrons the very fear that he was coming along made them give a better quality of milk. It is said the inspector should go to them in a friendly way. I don't want to be friendly with this class of people. I want to make it hot for them. If the inspectors had been a little more rigid here there would have been better results.

A Voice—Molasses catches more flies than vinegar.

Mr. Harris.—I think the inspectors generally carried their point.

Mr. James.—If the patrons would take it into their hands they could make it hot for the inspector.

Mr. Facey.—I propose that the inspectors should be Government officials.

Mr. **Casswell**.—I think if there was a Government analysis, so as to test the milk, there would be no difficulty with the inspectors. Mr. Ballantyne's law is a good one—if a man does wrong expel him. A man does not like to be expelled from a factory. What I got up to say is that we paid $149,000 a year for importing cheese just about the time reciprocity was broken off, and now we are exporting $9,000,000 worth. That does not amount to any thing in comparison with the agricultural interests connected with the dairy. We lose sight of the hog. There are a good many kinds of hogs, but I am speaking of the pig with four legs. (Laughter). The first result we get from the hog industry is the manure and the next is the money value of the hog itself, and I believe we would be astonished to know the amount of money that is raised in connection with the hog and the dairy. It must be something immense, and I wish we had some way of getting at the result. For instance, I went out to see a farmer in the neighborhood of Ingersoll. He had taken in a load of cheese and came home with another load. I asked him if he had brought back a load of cheese also. He said "I have brought back a load of hogs, and they are worth as much to me as cheese. I feed them and don't keep them shivering in the cold." He told me he had already realised $800 during the year from hogs, and had fifteen more to deliver and seventy more to winter over, all off his own farm.

Mr. **Lockhart**.—How much grain did he buy?

Mr. **Casswell**.—I do not believe he bought a bushel. He is a man who knows how to make a dollar and how to feed off his own farm. It is Mr. John Holmes, of Dorchester. Now, I have been astonished at factory owners, many years ago especially. You generally found their pig pens on the side of a hill where there was a creek so that the manure from their pigs could be washed away to save the trouble of carting it out. I want to say, no manure is so valuable to the farm as hog manure.

DAIRY UTENSILS.

Mr. **Casswell** read the following report which was adopted :

To the President and Directors of Dairymen's Association :

Gentlemen,--The committee on Dairy Utensils beg to report as follows : We find on exhibition an aerator, sold by C. H. Slawson & Co., Ingersoll, which we highly recommend to the patrons of cheese factories. We also find a press and hoops made by R. Whitelaw, of Woodstock; and also cheese hoops made by C. Lewis, of Salford, well made and well adapted for the business. The milk tester, the invention of Dr. Babcock, of the University of Wisconsin, for the estimation of fat in milk, we would confidently recommend to the convention.

C. Schragg,
E. Hunter,
John Fulton.

CLOSING PROCEEDINGS.

A resolution was passed, thanking Mr. W. H. Huston, Principal of Woodstock College, for the cordial invitation extended to the Association to visit that institution.

The **Chairman** then said : The time has now come when we must part I cannot allow the occasion to pass without thanking you very heartily for the orderly and business like manner in which you have conducted your business. I may say I never had the honor of presiding over a meeting where the order has been better and where those present evidently had a greater determination to transact their business in a proper way, or to try by means of discussion to improve their position in life. I now bid you all good bye, and hope to meet you another year.

The convention joined in singing "Auld Lang Syne," and then adjourned.

III.—CREAMERIES' ASSOCIATION OF ONTARIO.

OFFICERS FOR 1891.

President	D. Derbyshire, Brockville.
1st Vice-President	John Hannah, Seaforth.
2nd Vice-President	Aaron Wenger, Ayton.
Secretary-Treasurer	R. J. Graham, Belleville.

Directors:

Division No. 1.—John Croil, Aultsville.
Division No. 2.—Ira Morgan, Metcalfe.
Division No. 3.—T. J. Miller, Spencerville.
Division No. 4.—J. Sprague, Ameliasburg.
Division No. 5.—Robert Philp, Cadmus.
Division No. 6.—James Davies, Toronto.
Division No. 7.—David McCrae, Guelph.
Division No. 8.—W. G. Walton, Hamilton.
Division No. 9.—J. S. Pearce, London.
Division No. 10.—E. Miller, Parkhill.
Division No. 11.—Frank A. Walden, Ayton.
Division No. 12.—Arch. Wark, Wanstead.
Division No. 13.—J. N. Zinkann, Wellesley.

Executive Committee:

D. Derbyshire,
John Hannah,
J. S. Pearce,
Prof. Jas. W. Robertson.

LIST OF MEMBERS

FOR 1891.

NAME.	POST OFFICE.
Abrams & McLennan	Camerontown.
Aird, John	Seaforth.
Balkwell, Geo	Walkerton.
Bisnett, A. L	Blenheim.
Brill, S. R	Teeswater.
Brown, Thos	Holstein.
Brubacher, W. H.	St. Jacobs.
Caloren, Geo	Iroquois.
Carmichael, Jas	Arva.
Cheesman, Jas	Boston, Mass.
Collet, J. K	Wellesley.
Cooper, C. R	Toronto.
Croil, J. H	Aultsville.
Crosby, John	Marden.
Davies, Jas	Toronto.
Derbyshire, D	Brockville.
Dom. Dairy Supply Co	Quebec.
Eureka Salt Co.	New York.
Fairly, J	Seaforth.
Farmers' Advocate	London.
Fuller, V. E. (life member)	Hamilton.
Gilchrist, Duncan	Arkell.
Gladstone, Wm	Owen Sound.
Graham, R. J	Belleville.
Gunn, Flavelle & Co	Toronto.
Hannah, J	Seaforth.
Harcourt, Geo	O. A. C., Guelph.
Herbison, W	Clinton.
Hillborn, Isaac	Elmira.
Hughes, John	West Stockholm.
Hugh, Fred	Golden Lake.
Hunt, Harry	Belleville.
Johnston, Chas	Athens.
Johnston, Geo. R	Athens.
Johnston, David	Seaforth.
Jordan, M	Seaforth.
Kendell, John	Cedar Springs.
Kinsey, S. V	Guelph.
Knox, Robert	Harlock.
Lackner, J. L	Chesley.
Laidlaw, Wm	Ayton.
Lennie James	Guelph.
Lindley, H.	Cedar Springs.
Live Stock Journal Co	Toronto.
Macfarlane, Thos.	Ottawa.
Malcolm, F. S.	Innerkip.
Miller, Jas	Spencerville.
Miller, E	Parkhill.
Miller, Archie	Picton.
Miller, T. J	Spencerville.
Morgan, Ira	Metcalfe.
Moyer, M. (life member)	Toronto.
McCartney, Hugh	Brucefield.
McLean, M. Y	Seaforth.
McFarlane, D	Aberfoyle.
McIntosh, Alex	Mosborough.
McKechnie, Hiram	Elmside.
McLennan, D. F	Camerontown.
McMillan, J., M.P	Constance.
McPherson, Alex	Cedar Springs.
McTavish, J	Seaforth.
Pearce, J. S	London.
Pilow, Joseph	Camerontown.
Petrie, W. T	Holstein.

LIST OF MEMBERS—*Continued.*

NAME.	POST OFFICE.	NAME.	POST OFFICE.
Philp, John	Dromore.	Stewart, Peter	Park Hill.
Philp, Robert	Cadmus.	Struthers, Jas	Owen Sound.
Ramsay, R. H	Toronto.	Swan Bros	Toronto.
Randal, David	Athens.	Taylor & Williamson	Cedar Springs.
Rodgers, T. C	Durham.	Walden, F. A	Ayton.
Roke, Henry J	Owen Sound.	Walton, W. G	Hamilton.
Ross, Jas. T	Seaforth.	Wark, Arch	Wanstead.
Rutherford, W. D	Iroquois.	Watt, Geo	Harlock.
Sloan, J. B.	Leamington.	Wenger, A.	Ayton.
Smith Bros.	Churchville.	Wilson, D. D	Seaforth.
Sprague, J	Ameliasburg.	Zinkann, J. N	Wellesley.
Sprague, Mark.	Ameliasburg.		

SIXTH ANNUAL CONVENTION

OF THE

CREAMERIES' ASSOCIATION OF ONTARIO.

The sixth annual convention of the Ontario Creameries' Association was held in the town hall, Berlin, on the 13th and 14th of January, 1891. The meetings were among the most successful yet held by the Association, both in point of attendance and in regard to the animated nature of the discussions which took place. The authorities of the town, through their chief magistrate, Mayor Jansen, who was assiduous in his attentions throughout, extended a cordial welcome to the Association, presenting the members formally and in felicitous terms with "the freedom of the town." In addition to addresses by prominent persons specially interested in the supporting of creameries and the manufacture of butter generally, speeches were made by the Hon. John Dryden, Minister of Agriculture, Mr. I. E. Bowman, M.P. for North Waterloo, Mr. E. W. B. Snyder, M.P.P. for the same place, Prof. Robertson, Dominion Dairy Commissioner, Mr. Thos. Macfarlane, Dominion Analyst, Mayor Jansen, as already indicated, and the Mayor-elect, Mr. J. M. Staebler. Through the kindness of Mayor Jansen the proceedings of the evening meeting on the 13th were interspersed with music furnished by a local orchestra and glee club, and on the morning of the 14th such members as desired to go were treated to a drive through the town and a visit to various factories and public institutions of interest.

PRESIDENT'S ADDRESS.

The president, Mr. D. DERBYSHIRE, of Brockville, occupied the chair, and opened the convention with the following address :

I congratulate you on having this convention in such an enterprising town as Berlin. I thank you on behalf of the Association for the kind way we have been received. We hope to have a pleasant and profitable time, and to be able to take another step in advance of all our former efforts.

Our exhibit at the Industrial Exhibition, in September last, was the best ever made in the Dominion by far, and I would call your attention especially to the Ayton creamery. Mr. Wenger has been exceedingly enterprising in putting up his butter for local use. We should cultivate our home trade, and see that fancy butter is placed within the reach of all. I feel proud of the good work done by our secretary, Mr. Graham, and also by our inspector, Mr. Sprague.

The creamery business may be divided into two natural divisions, the men who produce the milk and the men who manufacture the butter. Both are equal partners in the business ; both must be honest and skilful in doing their share of the work or failure securing a good price and fair profit will be the result. Both are working to please, not themselves, but a third party, the consumer. The kind of butter he wants, the flavor that suits him, must be the law that governs them. Therefore, as dairymen and creamerymen we have a common interest in throwing away all of our stubborn and foolish notions. We must measure everything we do by the market standard, or we will be punished by incurring loss rather than gaining profit.

As the dairyman produces the milk he is the first one to be considered. As "Hoard's Dairyman" very truthfully says, he is the real manufacturer of the butter; the creameryman only separates it from the milk, salts it, packs it, and sells it. I want every farmer who sends his milk to a creamery to take this thought in, and sleep with it, eat with it, and live by it as long as he has anything to do with a creamery. In the first place the farmer must produce good rich milk. He must think hard and long on this point. He must strive to improve the quality of his cows; he must constantly weed out the poor ones, breed in or buy better ones. He must do this for his own sake as well as the sake of the combined institution, the creamery. The biggest humbug on earth is the notion that the creamery patron can cheat the creamery with poor cows, bad water, irregular care, and not end in cheating himself the worst of any man in the lot. "As a man thinketh so is he." If he gives himself up to such a standard of thought, he will end in poverty and disgrace. Therefore as patrons we must have a good high standard, to measure ourselves by, for the sake of our own success. Every patron should strive, just as quickly as possible, to know what constitutes a good cow; how to breed her and how to care for her. The average patron shows just what he knows on this question, by the returns he gets from his cows. That tells the story and there is no way of dodging it Visit any creamery you choose in Canada or the United States, and you will find a few patrons who are getting fifty per cent. more from their cows than the great majority.

It will pay you to ask the question, "What manner of men are they?" For it is the man that makes the cow. Every time you will find that they do not belong to the great general average. They say it does not pay to breed and care for a cow as the average dairyman does. Invariably you will find they are making a study of their business. You will find them subscribing for the best dairy paper they can get, buying the best dairy sire they can find, stabling their cows in the most comfortable way for the sake of the cow, cutting their hay at the time it will make the most milk when fed, building a silo and storing up all the sweet succulent food their good sense can devise, feeding a good liberal grain ration every day, in short trying by every means in their power to become first-class profit-making dairymen of themselves. That kind of a patron will not allow his cows to drink foul, stinking water; he is intelligent enough to know that foul water makes foul milk, and poor butter. That kind of a patron is a "joy forever" to the creamery proprietor and a blessing to dairy progress among his neighbors. He is the kind of a man to learn from, for he is a student himself. I am sorry to say that such men are mighty scarce, but, my friends, they are the only men who really make a good profit. Every patron in Canada can become just such a patron if he will only have pluck and sense enough to adopt the same methods himself. Remember, the foundation of the whole business rests on the patron. If he is foolish, stupid, unthinking, and negligent, no power on earth can make the business profitable in its best sense to him. We read every day of creameries here and there failing, because they were established in communities of farmers who will not become intelligent enough to do their work so that profit can come out of it. W. D. Hoard, Fort Atkinson, Wis., editor of "Hoard's Dairyman" and also proprietor with his son of one of the finest creameries in Wisconsin, gives a clear illustration of the value of a good sound dairy education among patrons, for the sake of their own profit. He stated in our meeting a year ago that he had one patron with a herd of thirty-five cows to whom he paid in cash sixty-three dollars per cow, as the earnings of that herd for the year, besides returning to him all the skim milk· Another patron, with a herd of twenty cows, got only forty dollars each. The cost of keeping the first herd was forty dollars apiece, leaving twenty-three dollars profit per cow to pay for labor invested. The cost of keeping the second herd was about thirty dollars, leaving ten dollars to pay for labor invested. The first made his cows produce nearly six thousand pounds of milk each, and considered the skim-milk worth fifteen dollars per cow. That is, he possessed intelligence enough to feed it so it would be worth that amount to him. It is doubtful if the second made his skim-milk worth to him more than five dollars per cow. There are thousands of such comparisons to be found in Canada to-day. The object of our Creameries' Association is to bring up this discouragingly low average, thereby benefiting ourselves and our country.

I am convinced more than ever that our creameries must turn their attention to the production of winter milk and butter. We are making butter in the summer when everybody is doing the same thing, hence prices are clean down below zero. I find that the most successful creameries in the United States are those which make the largest amount of butter in the winter. It is not a difficult thing for a farmer to change his herd over to a winter dairy, if he but once resolutely sets about it. The increased cost of keeping a cow in milk in winter is not fifteen per cent more than what is necessary to keep a dry cow as well as she ought to be kept if she is to do good work the next season. The profit on winter milk is over thirty per cent greater than is obtained on summer milk. The creamery can run just as well in winter as in summer, and if the farmer will provide warm, healthy stables, properly prepared food, such as ensilage and corn, he can in this way get much better pay for his time and labor.

Every creamery proprietor ought to consider that his creamery is a dairy school, and bring his patrons together several times a year to discuss all these questions that so vitally affect their mutual welfare, he ought to take advantage of every opportunity to disseminate useful dairy information among them. He must not forget that he owes a duty to the men who have trusted him, and he must discharge that duty to their benefit whenever possible. I wish it were possible to take the proprietor and patrons of every struggling creamery in the Dominion, and set them down by some of the most successful ones; they would learn more by comparison, in one day, of the true road to succes than they would get by grumbling, in ten years. We need more comparison. This convention is for getting you together so you may learn all you can by this method of comparison. I desire that you should ask questions, compare notes, and generally make yourselves at home. I believe the day is at hand when all milk delivered to creameries will have to be paid for by butter fat contained in it, which is the only fair way. Then every man will receive money according to skill exercised. It is certainly no injustice to any one to get pay for the butter contained in his milk. We know some that furnish milk with five per cent. butter fat, while others have only three per cent. in theirs. I want this fully discussed, because it must come into operation here. With all that has been said about making fine creamery butter, and all that has been said about the poor dairy butter, ninety-seven per cent. of all the butter is still made on the farms, when we all know that creamery butter is worth four cents a pound more. We must change all these things, or else we will go to the wall. In short we must have better cows, better stables, better food, with a silo on every farm, better educated men, who are determined to push forward or sell out, because we cannot live the way things are going on. Let us be alive to the necessity of getting more and better knowledge, and have it said that we creamery men have not met in vain; that we are fully alive to our interests, and that we will commence another season's operations with renewed vigor. I thank you for your patient hearing. (Applause).

Mr. JOHN SPRAGUE, (Ameliasburg)—Do you recommend to the people of this country the idea, when our cheese factories are closed, of making butter in the same buildings. As already remarked, the country to-day seems to be flooded with a poor quality of butter. The price for dairy butter is only fourteen or fifteen cents a pound, while that of creamery in the wholesale market is twenty-three cents, and the idea strikes me that by adopting some method whereby we could put separators in our cheese factoriess in the autumn the milk could be gathered in say three days in the week through the cold season and we could make butter through the late fall and early spring and in fact all winter, and on account of this favorable season for shipping we could export large quantities of butter. This has occurred to me, and I think it is a matter that should be brought before the people of the country.

The PRESIDENT—I would say a large creamery was started near Athens, which is about sixteen miles from Brockville, on the Brockville and Westport road, this last year, by Charles Johnston & Son, right in the heart of the finest dairy section in Canada, not that the soil is any better, but I believe that they put more skill into the business, and in the selection and stabling of the cow and get more money from her than in any other part of Ontario. They manufactured butter and put it up for local consumption, except about two hundred tubs that I shipped late on in the season. They sold it all through the summer for twenty-two cents. Then after the close of the season four cheese factories centred in his vicinity, the patrons of these, in place of furnishing milk to these factories just took the cream to the creamery. The result was that this factory was making ten pounds after the regular factory season closed for one it did before. So any one who had good sense enough to do so continued to furnish cream in this way, and yet there were right within the sound of the bell in Brockville, where we ought to be leading in dairy thought and everything else, men who would make butter and sell it in Brockville at sixteen cents a pound in the face of the fact that their neighbors were delivering it at the creamery to be made into butter which was selling at twenty-two cents. I offered Mr. Johnston twenty-two cents a pound for all he manufactured after the regular factory season and he made a large quantity and got his money for it. Now, it cost two and a half cents for manufacturing, and they did their own drawing. In other words, they got nineteen and a half cents and had no labor and received their skim-milk back, and at the same time the factory men made some money and that gave them some tone, because it put $100 in their pocket at the end of the season. Take every cheese factory section in Canada and the same thing could be done. Have one factory which is centrally located, put in a separator and make butter right along after the cheese season is closed, and by squeezing the cows to get all the milk you possibly can out of them and building them up you will be doing a good thing for yourselves and your neighbors and your country, and will be saving a lot of money that is now literally wasted.

Mr. R. J. Graham, Secretary-Treasurer.—I would just say in regard to the Belleville section, that most of the cheese factories close the end of September, and after that the price of butter goes down in Belleville. I have been selling all season for twenty-two to twenty-four cents, but at the close of the season the price of dairy butter went down to fourteen cents and the consequence was that the Belleville market was flooded with number three butter at fourteen or fifteen cents a pound. Just outside Belleville there is a large cheese factory where they could make butter from the first of October throughout the winter. At present there are a great many patrons that have cows, and as the price of butter goes down after the factory closes they do not care for making butter in very large quantities as they have not the proper facilities and the consequence is that those cows are allowed to go dry for four or five months. If they could send their cream to a butter factory and get twenty cents a pound they could afford to feed their cows well. I think this thing could be adopted in all cheese factory sections. I hope and trust that in our section after this where there are three or four factories they will combine and one of them make butter of the milk product.

Mr. Macfarlane—Mr. President, you seem to be the object of all our questions and it has occurred to me to propound one, viz., as to what manner of men these were who could not manage their own business properly. It has occurred to me to ask when the dairymen about Berlin seem to take so very little interest in the business of the Association—judged by the number assembled—whether there are butter factories in this neighborhood and whether the proper relations of confidence exist between the two classes you have referred to, viz., those who produce the milk and those who work it up into butter. There is no doubt the farmers here are certainly intelligent, thrifty and wealthy and ought to understand their own business. They ought to be entrusted with the ability to make out of their land all they can, and the question arises whether they have the proper confidence in the people managing factories for them. We all know the thrifty character of the people of Denmark, where this whole matter has been worked through. The manner in which the Danes worked their factories I brought up at the last meeting of the Association at Seaforth and I tried to emphasise there the manner of their working. The result of all their experience is this, that they found the best system for butter factories to be that those supplying the milk should also be the proprietors of the factory and get all and every advantage that the working up of the milk provided. They wanted in fact to get all the profit that was going from the beginning to the end. That they were able to do by the partnership system; that is to say that an equitable division of the profits was made with every supplier of milk to the exact extent of the number of his cows. This system I brought forward last year more for the purpose of bringing it before this Association, but it has occurred to me to ask whether such a system might not pe capable of gaining the confidence of the furnishers of milk in the neighborhood of Berlin, so that there might be a great deal more of it taken into the factory than seems to be the case at the present moment. I would like an expression of opinion from you as to whether that system would be likely to awaken more interest and get more patrons than the present system pursued in Western Ontario.

The **President**—Of course the experience that I have had would not exactly agree with that. We have had what we call union cheese factories in our vicinity and invariably they have not been successful—not for want of patronage, but it seemed to be everybody's business and nobody cared to touch it. My idea is that a creamery, managed by some skilful hand who has an interest in the business, as well as in the money invested, is more likely to exercise the greatest skill possible, to get the best patronage, to handle his creamery in the best way, and make it successful for himself and his neighbors. That is what I desired to deal with more fully in my address, that is the idea of the patron running the cow ten and a half months in the year, so that she will know that she is constructed on purpose to give milk and will keep right on giving it. You know that if one of your neighbors begins to play a game of pool every day that practice grows on him until he is perfectly worthless as a farmer. Now, what we want is to to take the cow; she begins to think if she is not milked right on in the fall that she has done her work inside of four and a half months; and she will dry up at the same time next fall, but those who have practically taken hold of the matter—I refer to Bissell and MacCrae—and watched and weighed their milk, have been successful because they have milked their cows right on. These are not thoroughbred cows, but half Holstein, and they have been milking them ten and a half months. The very first year by breeding and care they got a heifer to give twice as much milk as her mother did at her best. The man makes the cow, and it ought to be the greatest study and desire of everyone to see his own idea expressed in the cow and her capacity for giving milk.

His Worship, Mayor Jansen, who had come into the hall at this point, took the platform and said he desired to extend to the Association a cordial welcome to Berlin, and to present the members with the freedom of the town.

The President on behalf of the Association replied, thanking his worship most heartily for the cordial welcome he had extended, and assuring him that it was exactly what they expected to receive in such an enterprising place as Berlin.

Mr. John **Hannah** (Seaforth) resumed the discussion on the President's address: I would say as to the advisability of adopting the system of Denmark—of co-operation or partnership—that I think there are a few difficulties in the way. I do not know what the general intelligence is in Denmark, but I know in Canada and Western Ontario it is a little difficult to get farmers to go into any partnership I know that they are doing it in the cheese factory, but looking back to the early days of the cheese factory system it was nearly all done by private individuals, such as Mr. Ballantyne, Mr. Farrington and Mr. Lossee; and that system was worked up and all the difficulties overcome before co-operation took place. Of course there is a great deal to do in getting the farmers to take part in the creameries. I think where joint stock companies have been successful there has been one moving spirit that has done the principal part of the work. That is the position I think you will find it in at the present time in Western Ontario. After this stage is passed I dare say it is quite possible to run on the co-operative or partnership system, and I think in the majority of instances when the farmers get so far educated it is perhaps the best way; but in the early stages when everything is in doubt, when they don't know whether it is to be successful or not, it is impossible to get them to form together and stick together. I am very much pleased with the points brought out in the President's speech. I think all the work we will be able to accomplish has been foreshadowed in this masterly address.

Some of the points alone would form the subjects of discussion sufficient to engage the whole of our time. Take for instance the treatment of cows. There is no doubt a great lack of knowledge with regard to that. The President spoke of patrons that are only getting $14 from a cow throughout the season. There is no money in that and these are the hardest kind of patrons to give satisfaction to. It is the poor patrons, it is the parties that are making the poorest returns from the cow, that are dissatisfied. You cannot satisfy these men when they are only getting $14 per cow and every cow will eat $10 worth of hay in three months. Now, if this Creameries' Association, by its meeting here can do anything towards weeding out that class of patrons it will be quite a godsend to the creamery; and I think those are points that want to be looked to by farmers particularly. By comparison of their returns from the creamery with those made by making the butter themselves you can get them to come, but sometimes we have almost to try and shield the returns of some patrons from themselves, or else they would say the factory was trying to cheat them, or taking from one and giving to another, but it will have to be told and seen in the end.

The PRESIDENT, appointed His Worship the Mayor, Mr. Wenger and Mr. Moyer a local committee to arrange a programme for the speakers during the convention.

Mr. MOYER—The idea was suggested of turning cheese factories into butter factories in winter. I have always been a strong supporter of the creamery business, and I am afraid that would not do justice to the creameries. We all know that milk from grass in the summer is better than that from feed in winter, and I think in this way you will never establish a reputation for butter on a level with cheese. It will lead people to go into the cheese business in summer altogether. The President referred to the inferior butter we get. He should be very careful in talking about that point, because he knows that nobody makes it. (Laughter). I have had a good deal of experience in running a creamery, and I have always been of the opinion that a creamery business should be run by some enterprising person instead of by co-operation. I know I am not backed up in this altogether, but experience teaches it. Here is a creamery which has been run in this county by an incorporated company, and it has just been sold out to an individual. I think it is settled that the creamery must be run on the same basis as any other business. We would laugh at a farmer grinding wheat and taking flour to the market in order to get the most out of it. If a man puts his whole time into his business he is more likely to pay attention to the details. Everybody's business is nobody's business. I never saw a creamery operated by farmers from its start. After it had been got into good shape by some individual I have seen the factory taken over by the farmers but it generally stood there; it did not make any progress.

The PRESIDENT—I think Mr. Moyer has made a small mistake with regard to the cheese factories. My idea was that we should extend the operations of our creameries as far as possible for the whole year, but in sections where cheese is now manufactured I believe we should start a separator in the best one of four factories, to continue to get all this milk together and manufacture butter out of the cream of these parties whose milk had made cheese all the rest of the year. I would not interfere with our creameries. While ninety-seven per cent. of the butter is made by the farmers, our reputation will never be better than at the present time.

Mr. MACFARLANE—I would like to say, in regard to the question of co operation, it seems to me I have been fairly sat upon. I certainly do not see any prospect of the adoption of that system in Canada. I should like merely to ask those who are interested in this question to read what has been stated on the subject at the last meeting of this Association, and gave due weight to the facts and figures gained in Denmark. If they do not get any argument to convince them of the advantages of the co-operative system they may perhaps get at a great many that will assist them in ordinary business.

Mr. GRAHAM—Just before closing I would like to add a word or two on this subject. The largest cheese factory in eastern Ontario, which has been twenty five years in operation, was this last fall sold to a private individual. The reason was that right on the same street was a factory built by a private individual, and the man that run the factory paid $5.50 per standard of three thousand pounds of milk more than the factory run on the co-operative system. In our county, of sixty factories about one-third were run by private individuals, and I gave this as an instance showing that the factories run in that way paid more.

The convention then adjourned till 2 o'clock.

AFTERNOON SESSION.

The members having re-assembled at 2 o'clock the President called attention to some exhibits made by E. J. White & Co., of Belleville, in the shape of butter boxes, adapted for the local trade and suitable for holding from one pound up to ten pounds, and manufactured of wood with parafine lining, which is caculated to keep the butter pure and free from the taste of the wood and exposure to the air.

COMMITTEES.

The following committees were then struck :
Order of Business—Messrs. A. Wenger, M. Moyer, and Mayor Jansen.
Nominations—Messrs. A. Wenger, J. Hannah, R. J. Graham, and J. Sprague.
Dairy Utensils—Messrs. M. Moyer, E. Miller, and M. Sprague.
Resolutions—Prof. Robertson, Messrs. D. Derbyshire, and P. E. W. Moyer.
Finance—Mesers. M. Moyer, J. H. Croil, and Mayor Jansen.
Legislation—Prof. Robertson, Messrs. M. Moyer and D. Derbyshire.

FERTILISERS.

Mr. **Thomas Macfarlane**, Dominion Analyst, Ottawa, being called upon, was received with applause. He said : At the last meeting of the Association in Seaforth he had read a paper full of facts and figures, but observing that an address seemed to receive more apprehension he now undertook to speak to them without notes, although he felt pretty much like a man handling a new horse, not being very sure whether the result was going to be a break-down or a runaway. However, I will start to give you a talk which may interest those who usually come to such meetings as this. On former occasions I have brought before you subjects more immediately connected with the testing of milk and the manufacture of butter and cheese, but as our worthy President said this morning, the matters that come before you for consideration can be divided into two classes ; those which concern the manufacture of butter and cheese, and those which concern the production of the raw material, namely, the milk. He stated that matter very well, and my subject on this occasion shall refer more to the production of milk than the manufacture of butter or cheese. The manner in which cows should be treated, the proper food for them and many others, are subjects of great importance in dairying, but I would go deeper down and say that a farm in good heart ought to be considered to be quite as necessary for the cheap production of milk. A good farm ought to be like an account in a bank, or rather like capital laid out at interest ; it should be able to support the farmer from the interest alone, and the capital—that is to say the richness of the soil—ought to remain unimpaired. Connected with this very matter is the question of artificial manure (fertilisers) with which we in Ottawa, especially in my branch, have a great deal to do. Now, I am not here for the purpose of advocating the use of artificial manures ; certainly not until the farmers are better aware of how to take advantage of the natural manures on their farms. Artificial manures I consider to be very much of a nature parallel to medicine. The doctor when called in merely uses medicine to assist nature. He does not expect that his patient is going to fatten on it.

So it is with fertilisers ; these are only of use to the farmers for the purpose of helping nature in her efforts to feed the plant. Now, besides having to do very considerably in the Laboratory branch at Ottawa with the testing of food and other preparations—milk included—we have also to do with the analysis of these same fertilisers, and in doing our duty with regard to them, in examining them and finding out all that is possible to know about them, in order to be in a position to advise other people concerning their manufacture and use, we have very frequently to post ourselves with regard to what is doing in connection with them in other countries. We think this is advisable ; we have to do it ; it is part of our business ; and in thus studying what takes place in other countries and in reading the journals published in other countries in regard to the application of these fertilisers, and in regard to agriculture and its interests generally, we acquire a great deal of information which the ordinary farmer or dairyman cannot be expected to collect, and it is for us who are in the position of being able to gain this information and who are the servants of the Government and the people to place ourselves at the disposal of the people and lay that information before them. It is this I wish to do on the present occasion, and I may mention that I am not here of my own motion. When asked by the secretary of this Association to attend the present convention I applied to the Hon. Mr. Costigan, Minister of Inland Revenue, for permission to do so, which was readily granted, and it is by his consent that I am able to be here and give you the benefit of any information I have gained in the execution of my duties. I shall not say very much in regard to the operation of the Fertilisers' Act in Canada, although I am ready to answer any questions any person may ask on that subject ; I shall merely advert to the fertilising constituents which are present in all those artificial manures and their values, in order that if possible, farmers and dairymen may realise the actual market value of substances that they are daily handling, and in order that they may learn to appreciate these. There are materials passing through their hands, sometimes carefully, sometimes carelessly, which if they had to buy in the open market would cost them large sums of money. I may mention that according to the operation of the Fertilisers' Act, passed at the last session of parliament, we are now bound to give in our reports a statement of the relative value of each of these fertilisers for the information of the public. Now, this value has to be calculated per ton for all fertilisers offered for sale in Canada, and it is computed by taking the quantity of fertilising constituents in pounds which they contain, and multiplying it by their ordinary prices in the market. The valuable constituents are three —potash, phosphoric acid, and nitrogen. That is not a large number to remember, and I shall not trouble you very much with two of them. However, I would like you to remember that the relative values are something like this: phosphoric acid is about twice the value of potash, and nitrogen twice the value of phosphoric acid. That is to say, if potash stood at four cents per pound you would have to pay eight cents per pound for phosphoric acid and sixteen cents per pound for nitrogen. These are very nearly the prices which the farmer has to pay if he wishes to buy in the open market such fertilising materials. Nitrogen is the most costly, and it is about that particular fertilising ingredient that I wish to talk to-day, because, while it is of great interest for the general farmer, it is also of great interest to the dairyman. Now, with regard to this one element, nitrogen, you will all say, " Well what is this nitrogen ?" I answer, it is a very important constituent in foods and fodders, and especially in those foods which contribute towards the formation of blood and muscle. It is one of the essential constituents of casein, of cheese, in which you are all interested. It is not, I am glad to say, present in butter at all. Therefore, if you produce butter and sell it off your farms you may pride yourselves on one thing, that you are not selling away any nitrogen, and, therefore, the farmer who sells only butter is certainly not impoverishing his farm. But I want to call your attention more particularly to a source of nitrogen which the farmer, if he is aware of its existence, certainly does not take advantage of. Like the famous McGinty, we live at the bottom of a sea of nitrogen. The atmosphere that we live in and breathe consists, four-fifths of it, of nitrogen. Now, that may be very strange to you, that four-fifths of such a common thing as air consists of a substance worth as much as sixteen or seventeen cents a pound—worth as much as ordinary butter in your market. Therefore, you will see that it is a very great advantage to get hold of that element in some way or other, and when you have got hold of it to keep it. Well, we have got it surrounding us everywhere. It there were any school boy here I am sure he could tell me the pressure of the atmosphere upon the earth's surface. I dare say many here know that it presses at the rate of fifteen pounds on every square inch. It follows then that if there are fifteen pounds of air pressing upon one square inch, and if four fifths of the atmosphere consists of nitrogen, there must be twelve pounds of that nitrogen resting upon every square inch of our earth's area. Twelve pounds of nitrogen at seventeen cents per pound make $2.04, and this is the value of the nitrogen that lies upon each square inch of the earth's surface. What does that come to per square foot? There are 144 square inches in a foot, which makes about $238.00 worth of nitrogen resting upon every square foot of the earth's surface. If we went on calculating in this way we would come to see that on a hundred acres the amount is something over one thousand millions of dollars. That would be a very valuable farm indeed if the owner could convert the nitrogen resting on it into pounds, shillings and pence. If he could convert a very small fraction of it into cash he would be a very rich man. I mention this to show that nitrogen has a very great value for the farmer or any one who can fix it. This fixation of nitrogen has long attracted the attention of chemists. They have for years back—half a century at least—been exerting all their ability to convert that nitrogen of the atmosphere into something they could sell. They have been trying to get it converted into cyanogen, which makes up a great part of the substance known as Prussian blue. They have also tried to get it used in making saltpetre. They have also been trying to get it converted into ammonia in order that they might realise something handsome from the enormous wealth of nitrogen stored in the atmosphere. They have been able to do it to a certain extent but never in such a way as to pay them for the attempt; and yet all this while there is one man, I don't know whether he is a tradesman or a professional man, to whom it is given to convert the nitrogen of the atmosphere into something of value, and that man is the farmer.

Mr. DERBYSHIRE.—Call him a professional man.

Mr. MACFARLANE—Well, when we consider all the advantages at his disposal and the skill required to take advantage of them, his ought to be the first of the professions. But to return to our subject. Priestly was, I think, the first to state that certain plants have the faculty of being able to take nitrogen from the atmosphere and fix it in themselves and in the soils connected with them. This has long been maintained, but only within the last ten years has it been proved to the satisfaction of every man, scientific farmers and scientists included, to be the case It is now a well established scientific fact that plants of a certain class, which the farmers raise every year, have the faculty of converting nitrogen into a shape in which it is realisable at the rate of seventeen cents per pound. It is well known that such plants as pease, beans, lentils, lucerne, vetches, clover, lupins and others, have the faculty of enriching the soil. These plants do so because they have the property of fixing nitrogen. If you choose to raise grain or corn they cannot thus procure their nitrogen from the atmosphere. It has got to be supplied to them in the shape of manure if they are to be able to take advantage of it, but those other plants or crops that I have mentioned, the pease, the beans, the clover, etc., or what the botanist calls the *leguminosæ*, have the property of being able to take that nitrogen from the atmosphere and appropriate it to themselves. As I said before, the fact has long been known or suspected, but it was not until quite recently that a certain farmer, who was not a scientist, named Schultz, who possessed a farm called Lupitz, in the north of Germany, went to work and proved it practically and gave such an explanation of what took place as excited the attention of the scientific men of his country, and then scientific controversy began, and it has rained pamphlets on this subject ever since. I will try to explain what it was that farmer Schultz did, and I will relate the facts as they are given by thoroughly reliable practical men. Mr. Schultz owned, or bought, or acquired a farm in north Germany, which consisted almost wholly of a light sandy soil, and I suppose you all know how hard it is to make money on a farm of that description. It was so poor that he could not raise anything to advantage. He tried raising a fodder which is commonly grown in the north of

Germany, namely, lupins. He could not even raise them at a profit. He was able, by spending money for large quantities of artificial manure, to raise something, but not to pay. Just about the same time as he was struggling with his difficulties, the salt mines of Strassfurt were discovered in North Germany. You are all aware that though the bore-holes were sunk to obtain rock salt, they discovered, besides it, other minerals containing potash. This was an accidental discovery. It was made about the time that Schultz was engaged in working his farm. It was not long afterwards until shafts were sunk into the deposits, and various minerals and salts containing potash varying all the way from twelve to twenty per cent. in their natural state, were opened up. Mr. Schultz heard that they were of great value on account of their potash, agriculturally. He thought he would try them as a last resort. He purchased the quality known as kainite and used it at a rate of about something less than one hundred and fifty pounds per acre. He sowed it upon the land which was yielding lupins, and to his astonishment he got a larger crop than he expected, and more remunerative. He was able, by applying these potash salts alone, to get large crops of lupins and peas and beans and clover, at the same time, he applied no nitrogen. There was none present in his sandy soil, and yet the resulting crops were highly nitrogenous. He thus obtained a practical proof that these plants stole their nitrogen from the atmosphere. He proved further that by growing these leguminous plants he gave the grain crops which followed them in the rotation a supply of nitrogen which assisted their growth, and he had as large grain crops as his neighbors. He did not, in order to supply nitrogen for raising these grain crops, plough in the previous ones. He harvested his peas or clover and made use of them, and he found that the roots of those left in the ground contained sufficient nitrogen to sustain the grain crop afterwards. He characterised wheat, barley, oats, etc., as crops which consume nitrogen, and he characterised the clover crop and the crops that are analagous to it as those which collect the nitrogen. He therefore settled down to conducting his farm in this way, raising first the clover and pea and bean crops, etc, that were necessary for grain crops, and he succeeded perfectly. He found that by putting a grain crop after potatoes, for instance, he got no result at all without nitrogen, which cost him money, but if he sowed grain after the clover was off the ground he succeeded perfectly, and his rotation thereafter consisted in sowing first nitrogen collectors and the second year nitrogen consumers. In this way he was able to go on making his farm pay and enriching it at the same time. He happened to be a man of considerable intelligence; he published the whole of these results, and ever since the discussion has been going on in Germany. The subject was taken up by two German professors whose business was that of agricultural chemists. Their names are Wagner and Hellriegel. Independently of each other they set to work to get the scientific demonstration of what Schultz had shown to be a fact, and carried on experiments underneath glass jars or domes on plots of ground, and in vessels resembling large flower-pots, but the particulars of these I need not give and it is quite sufficient to say that these proved to the satisfaction of scientific men in Germany and elsewhere that it is possible for the farmer to acquire nitrogen from the atmosphere and that he does not require to purchase it from any other source. He can get that which is an essential food for wheat, barley, etc., by the intervention of such crops as I have mentioned. I suppose it will be said that there is nothing new in this, that many farmers here and there have done the same thing. It is well known that clover has an advantageous effect, and possibly also some of you may have had experience of that sort; but it is one thing to have the experience and another to have the explanation as to the reason why the sowing of clover is to the farmer's great advantage. I believe that an explanation of the cause will come before him with redoubled force and induce him to widen his experience and take advantage of those circumstances of which he knows the effect has been demonstrated. He may follow Schultz' example and be perfectly sure that by employing the same means he will get the same results. Nature is the same everywhere, the same in Germany as here. At any rate, the atmosphere is the same and what they have taken out of the atmosphere in Germany may also be taken advantage of in Canada. Of course, in a new country you have to consider the climate, but in this matter I do not think it is neces sary. It is simply necessary that the farmer should make up his mind to apply the same principles here that have been applied in Germay and elsewhere with great advantage. The chief thing is to remember that nitrogen is essential to the growing of his most valuable crops; that nitrogen to be presented to those crops directly in fertilisers will cost a large amount of money, seventeen cents a pound, but that you can acquire it from the atmosphere by growing in advance of the grain crop a clover or bean or pea crop, without its costing anything. Now, I think that it is, perhaps, as well not to occupy too much of your time in talking upon this subject without allowing some one else to get in a word edgeways, and I would much rather be questioned on the subject than go on saying over and over the same thing. I do not know whether I am preaching above the heads of my congregation or not, perhaps I have been preaching beneath the capacity of my audience. I am reminded by this of an incident which occurred in my own experience. I am a Scotchman and a member of a St. Andrew's Society, and on one occasion I got a letter from the secretary telling me that I was in arrears to the extent of seven or eight dollars. Well, I had not been in the place more than one or two years and I could not understand how I could be so much in arrears, and wrote to the secretary asking him information on the subject. He gave me an account showing that there was one dollar due when I lived in such and such a street, and one dollar when I lived in such another street, but I had never lived at any of those places, and so I wrote back to him to say that he had "got the wrang soo by the lug." (Laughter.) Now, this is not the joke. The joke is that the secretary did not understand and wrote back to ask me what I meant. (Laughter.) I give you that as an instance of preaching beneath the capacity of an audience.

Mr. MOSES MOYER—Do I understand you to say that the fertility of the soil can be kept up by raising a crop of leguminous plants without supplying fertility by manure or in any other way?

Mr. MACFARLANE—Yes, provided you supply the inorganic constituents; that is the result of the experience I have been speaking of. One particular element, nitrogen, can be supplied from the atmosphere in this way. But it is not thereby meant that nothing else is required for a particular plant. I have mentioned that potash and phosphoric acid are advantageous for the growth of most plants. They have got to be supplied. These the farmer must get and apply under certain circumstances and conditions, but I was going to call your attention to the fact that those are the cheapest among our fertilising materials. They cost you less money and you can very easily procure them. There is very little of these fertilisers sold in Canada compared with the population, and the reason is because manufacturers of the fertilisers are obliged to put in nitrogen at the cost of seventeen cents a pound to supply that which the farmer might himself procure. We will take, for instance, a compound fertiliser, that is to say, one that not only contains the inorganic constituents, potash and phosphoric acid, but nitrogen to such an extent as to be appreciated by the grain crops to which it is applied. That must usually amount to five per cent. to be effective at all. The manufacturer must buy dry dried blood or sulphate of ammonia, or nitrate of soda, in order that the nitrogen shall be supplied. We will take a fertiliser containing five per cent. of nitrogen. There are twenty hundred weight in a ton. That means that every ton must contain one hundred pounds of nitrogen. Well, one hundred pounds of nitrogen at sixteen or seventeen cents a pound increases the cost of a ton of these fertilisers by sixteen or seventeen dollars. It makes a great difference to the farmers whether the fertilisers cost twenty-six dollars or only ten dollars per ton. If the farmers would only do their duty, that is, take advantage of the natural store of nitrogen all around them in the atmosphere, they could very easily purchase fertilisers containing phosphoric acid and potash. Now, the fertilisers which Schultz supplied was one containing potash—principally kainite—and which was produced at a low price. Now, you take wood ashes; if to-day you want to buy wood ashes on account of the potash they contain, you will have to pay probably at the rate of six cents per pound for the potash. But the potash in such material as kainite probably does not cost more than two cents in Germany. Therefore, Schultz was able to use them in large quantities, and by growing leguminous plants was able to steal the nitrogen from the atmosphere. Opinions may be divided as to how these plants really do this and why it is that grain crops cannot. It is, indeed, a very curious thing that barley or oats or corn have not this faculty, and the controversy is still raging as to the means by which the leguminous plants effect the transformation. People are now theorising and have called in the microbe to explain. Certainly scientific people who are bound to explain go to the roots of everything, have gone to the roots of pease, and found excresences on these roots and believe, that in these lies the machinery, whereby the transformation is effective. They say that the little bulbs on the roots are little houses in which dwell the microbes or bacilli by which the nitrogen is assimilated. I merely mention this point as the farthest that has been reached by Hellriegel in explaining how beans, pease, clover, etc., exert their power of taking from the air that material for the use of the farmer which costs him as much as he gets for his butter.

Mr. Moses Moyer--This is certainly very interesting to me. Farmers here are in the habit of plowing down their clover. Do I understand you to mean that some nitrogen is stored in the roots ?

Mr. Macfarlane—Yes, sir. That is certainly the result of Mr. Schultz's experience.

Mr. John Philp (Dromore.)—I had a field of clover and in the fall I was plowing it down when a neighbor came along and asked me what I was doing. I said "I am going to plow in this crop." "Well, he said, that is not giving the land a chance. Why, you have only meadowed it one year." I said "That is all right." The next season the same gentleman came along and I had a fine field of wheat there. He said "That is the best field of wheat I have seen." I just clapped the old man on the back and reminded him of what he said about not giving my land a chance. I said, "The cost of the clover seed would not be so great as the hire of a man to put on manure." I agree with the Professor's speech very much.

Mr. Samuel Hunter—I understand the Professor to say that there were several things requisite to enable the farmer to produce a good dairy product; amongst the first was a good fertile farm. I would ask if the best way of adding fertility is to commence dairying and especially winter dairying. Could a farm not be enriched in that way ?

Mr. Macfarlane—I am much obliged to Mr. Philp, who has given practical reasons for agreeing with the theories I have brought forward. Mr. Hunter has adverted to something I proposed to go into after disposing of the first part of the subject. I did not, however, exactly understand his question.

The President—He wants to know if going into winter dairying and keeping more cows and raising less grain would not tend to enrich our soil and help the farmer to make more money for himself.

Mr. Macfarlane--I believe there is no doubt about that. I was going to say something about that in tracing the further history of nitrogen, and if no one has any further questions to ask just now about the fixation of nitrogen we shall go on and try to follow up this nitrogen. It is quite an interesting history. When a boy I used to read all sorts of trash and among other things something which is not trash, namely, the Waverley novels. One of them, called the "Fortunes of Nigel," I found very entertaining, but I now think that if farmers and other people properly studied the 'fortunes of nitrogen" it would probably result in their making their own fortunes. We will suppose by one means or another, but especially by stealing it from the atmosphere, the farmer has got the nitrogen lodged in the soil. Well, we will try and trace what becomes of this nitrogen. We will suppose you have raised, by means of nitrogen, a crop of clover and one of grain. Well, the grain you cut to realise on it. The nitrogen has found its way into the ears of the grain. It forms the most important constituent of the gluten contained in the grain, and that you want to sell off and convert into money. You are realising that which you took with the good permission of kind Dame Nature. Well, if you would go on in the same way and grow more grain you have got to produce more nitrogen on your farm or purchase it. You do otherwise with the clover. The clover is cut and taken into the barn and it is fed to the cattle along with other valuable fodder. Part of the nitrogen that is fed to the animals is used by them in order to build up their frames, their muscle, their flesh, and a certain portion of it passes unappropriated through the body. A certain part of the phosphoric acid goes into the bone, and that along with some potash and nitrogen is contained in and sold with the animal, but the nitrogen thus sold is a very small fraction compared to that which passes through the animal. By far the greatest portion, at least 80 per cent. is to be found in the manure that is collected in the manure heap or what I think the farmer should call his "treasury." Now, I must tell you that nitrogen is a very unstable element. It seems to unite with other elements under protest and is unfortunately always wishing to return to its original condition. It is always striving to outwit you, always striving to get back to the atmosphere again, and it will require all the intelligence of the farmer to retain it. There lies the art of the farmer. He must first catch it and then keep it. I am sorry that this is not very well attended to. The President gave you an instance of bad farming when speaking of wintering cattle in referring to the man who neglects his cows in winter. Well, you have got a parallel to that man in the farmer who pays no attention to his manure heap. Almost everywhere I have travelled in Ontario I have seen the manure thrown out and exposed to the winds and rains of heaven, and all the time the nitrogen is escaping. It is very sensitive, takes the huff easily, and if not fixed goes back to the air and careers over your head and laughs at your folly. By intelligent action the farmer can retain the nitrogen which he has acquired from the atmosphere. "Well," someone asks, "how are we to know when we are losing this nitrogen?" In the first place very many of you, I have no doubt, in going into a stable, more especially a horse stable, have often been met by a very pungent smell. What is that? It is called ammonia, and in that form the nitrogen is flying away from you. Then, in another part of the barn you will see trickling away from the manure heap or the stable a little brown stream of liquor. That is the nitrogen in company with the potash oozing away. These are the leaks that the farmer allows to go on in his establishment, and he must suffer from it. Just as great leaks take place there as if when taking sacks to the mill he allows the grain to trickle out on the road. There is no difficulty in preventing this nitrogen from running away. The smell I have spoken of can easily be prevented by means not at all new. It has been talked of for fifty years. Here in Ontario you have inexhaustible supplies of common land plaster. It is cheap enough; I do not believe it costs over six or seven dollars a ton. By simply sprinkling a little ground plaster in the stable under and behind the animals the smell disappears. The sulphuric acid of the plaster takes hold of the nitrogen and puts it into a condition in which it cannot possibly escape and it is swept away with the manure into the manure heap. Not only so, but the plaster has the faculty of preserving that manure better than you possibly could in any other way. I do not mean preserving it if it is thrown out of doors. It must be kept in a covered shed. To have manure exposed to the air simply shows an utter want of intelligence; the farmer who allows this is working against the interests of his own pocket. If it is thrown out of doors what happens? The first thing that happens in this climate is that you have got a layer on the ground and then comes a layer of snow. Then out comes another heap of manure and then snow again, and so the manure is kept in quite a cold, miserable condition and cannot ferment and get into the condition the plant likes. That is the first result. The second is this, that when that snow melts it simply dissolves out of the manure anything that is good. The ammonia and potash go in that way and the resulting manure is scarcely worth the trouble to you of carting out to the field. There is then a perfectly easy system whereby by the use of plaster and proper care valuable constituents once obtained can be retained in the manure heap. In answer to Mr. Hunter's question as to winter dairying, it may be said that is by far the most profitable system of using up farm produce. As I said before, at least 80 per cent. of the nitrogen of the fodder finds its way into the manure heap. If, however, you sell your milk to the cheese factory you are certainly taking away a large quantity of the nitrogen which you have acquired with so much trouble. The milk contains about four per cent. of albuminoids, mostly casein—the constituent containing the nitrogen and used in the manufacture of cheese—and when you sell away the milk to the cheese factory you sell away part of your nitrogen which you have obtained with so much trouble from the atmosphere. On the other hand, if you sell to the butter factory and so arrange that the skim-milk is returned to the farm to raise young stock upon, you receive all the nitrogen back and it is replaced on the farm again. In that way, if you choose to get money by butter rather than by cheese, you do so much the more to keep your farm richer and in good heart. The butter contains no nitrogen, and if you take the proper means for fixing and keeping the nitrogen which are at your disposal by means of nitrogen collectors and land plaster, your farm must inevitably year by year be getting richer. I have only good words to say with regard to the keeping of stock and the getting of manure from it. My principal object was to show in addition that you could acquire more of this valuable stuff, nitrogen, by a certain course of cropping, and if adopted there is no question that the farm must increase its yield and get richer as time goes on. Much of what I have said today has been said before. It is thirty years since I first read that old old story as to the use of land plaster, in a book written by a German agriculturist, entitled "A pound of nitrogen for a penny." That book, published many years ago, gave actual, practical demonstration that by the use of plaster you could retain the nitrogen of barnyard manure. It is an old story, but, like many another story, it is none the worse for being twice told. I tell it again in the hope that some may believe it and endeavor to practice it. (Applause.)

The President—What Mr. Macfarlane really wants is that we should raise a great deal more to the acre; have more and better crops; feed more and better food to more and better cattle and realise more and better results from those cattle. I think it ought to be the aim of every dairyman to have a better dairy cow fed by better methods; utilising all those things which have been given for his benefit; feeding strong, healthy crops; feeding them to strong and healthy cattle, exactly adapted for making the best quality of cream suitable for manufacturing the finest quality of butter, and in this way making money for himself and being an honor to his neighborhood and his country. It is a great and worthy aim and one which will help to secure for man enlarged influence.

Mr. Hunter—I think, if I understand the Professor, he is not an advocate of taking out the raw manure and spreading it on the land. I understand he prefers ripening it in a heap.

Mr. Macfarlane—Yes, that is so far as my small experience goes. If carted straight out to the field the chances are greater for having it leached out by snow and rain. Of course, in that case the leaching is done on the land and the soluble matter is not quite lost if you get it at the place you want it. I know this, that when plaster is used in the stable and the manure is kept from being exposed to the atmosphere it benefits the manure very greatly. I have seen it dropped through a hole in the stable into a space below, and in fact that is a common custom which prevails in the province of Quebec. I do not know whether you will approve of that or not, but down there they set great store by it. We are in the habit of supposing that the French habitants have no great intelligence, but they have intelligence enough for that. (Laughter.) When plaster is used at the same time moderate decomposition takes place, sufficient just to rot the straw, and bring the whole to the consistency of soft cheese and put it in the best possible condition for the plants outside on the fields to take advantage of.

Mr. Isaac Hillborn—Part of my manure is under cover and part of it is not. Is there not often a loss for want of water by too much heating.

Mr. Macfarlane—There is no doubt that when you keep it away from the water altogether a lot of nitrogen goes off, but that can be prevented in two ways. You can keep the manure moist. That is one of the best ways to prevent what is called "fire-fanging." The introduction of plaster prevents the same thing. I know of no instance of it occurring when the manure was plastered.

Mr. J. B. Ashley—I would like to know whether Mr. Macfarlane thinks we, as farmers, have room to stow all our manure under a shed without at sometime during the winter taking it to the fields? We cannot possibly stow all our manure under a shed. We must eventually take it out on the land before spring comes.

Mr. Macfarlane—If the necessity exists for taking the manure into the fields I should say let it be done, but by all means see that nothing escapes from it in the shed. Any loss that takes place in the field, if plaster has been used, is from leakage and that is kept on the soil to some extent. Any escape of nitrogen into the atmosphere is impossible with plastered manure.

Mr. H. G. Clark—What effect will sprinkling wood ashes on the stable floor have, and what kind of stable manure would you recommend on mangels?

Mr. Macfarlane—I should think the scattering of wood ashes would have a bad effect. It would have a tendency to liberate the nitrogen in the shape of ammonia. Some people have also thought that by using common caustic lime they were doing just as well as using plaster. The result of its use also will be to liberate valuable constituents from the manure. In regard to the second question that the gentleman has just put, there are a great many things to be considered, such, for instance, as the condition and nature of the soil. I do not think that I am sufficiently wise to give a short answer to that question.

The President—I would not, until we stop the leak in the stable floor by the use of land plaster, buy a single ton of fertiliser. I believe that if we got the manure to the field in a proper condition there would not be any fertilisers bought. I don't say anything against them, but I think it is a great mistake to buy constituents which we have already, and see thousands of dollars wasted through improper care of our stable manure.

Mr. Macfarlane—What the president has said in regard to nitrogen I fully endorse. We would never require to buy it if proper care were taken with the natural manure, but if you are selling produce off the farm that takes away phosphoric acid and potash you must do something to replace them.

The President—I have to thank the Professor very warmly for the able address we have received. It has been exactly what we desired. I have now great pleasure in introducing Mr. Sprague, and I hope he will devote a large portion of his time to the silo, because that is the most important question we have in this country to-day.

ENSILAGE AND WINTER DAIRYING.

Mr. John Sprague (Ameliasburg) was next introduced. He said: I am very much pleased with the address of our president this morning. It was a very practical one. I think he foreshadowed what would be sufficient to occupy a meeting of this kind for several days without entering into other matters as should be done. I was also pleased with everything else which has occurred to-day but one thing, and that is being called upon to speak to you this afternoon. I am like the man who got married, and after the ceremony said he felt very despondent. His best man asked him as to the cause of his trouble, and why he was not more cheerful, "Well," he said "the day would come sometime—he did not know how long it might be—when his wife would die, and then there would be the expense of the funeral." (Laughter). I do not think I have taken in what has been said as I would have done if I had not been aware that I would have to speak. I anticipated the end from the beginning. Now, our President has introduced me to you as an old dairyman from Prince Edward but I may inform you from the outset that I am no public speaker; that is not in my line of business. It is very easy to sit and talk about these questions, but it is a different matter to get up here and speak, and the effect is to produce a sort of weakness in the knee, and the voice does not have the natural sound in your ear, and all these things tend to make your own position very unpleasant. However, I hope you will bear with me this afternoon remembering that I am not a public speaker.

I have given the dairy industry my attention for twenty-three years. My first experience was with the co-operative system. I think we had about the first factory east of Toronto. That factory was established on the joint stock principle. It languished under the management of many men and eventually became defunct. Immediately after that catastrophe occurred I myself established a cheese factory in our neighborhood on my own farm, and during all these years I have been "boring" away in that direction to a certain extent. Five years ago—1885, I think it was—I introduced a Laval separator. Since that time we have conducted our operations both in the manufacturing of cheese and butter, something on this line in the early part of the season to make butter, receiving the milk from the farmers, taking the cream from it and manufacturing it into good butter. Good butter is our forte. We return the milk to the farmers. This continues till the first of May, and we run cheese through the hot season until, say about the month of August, when we commence skimming again and making butter. We usually continue making cheese until the factory season closes. At the close of the factory season we buy all the milk we can from the farmers. We have been paying last year—we are paying now—a cent a pound for milk. We are making butter that we are getting twenty-two cents a pound for. Well, I can go to hundreds who get from sixteen to eighteen cents. The fact is that the relative loss is so large that we as farmers cannot afford to face that loss. I think it has been something like four or five cents a pound on butter. The loss is actually greater than that. I believe that we in this country, by adopting a system a little different to what we have at present, could make up our minds to continue dairying operations the year round. It is astonishing how quickly certain modes of operation become natural to you when you once adopt them. Years ago we considered that when the factories closed the operations of the cow ceased. We acted as the dry nurses to them. When milk was cheap in the spring we had plenty of it and when it was dear in the winter we had none to sell. Now, to a certain extent, we have changed that line of action, and it is quite pleasing to us as dairymen that we have adopted a means whereby we can get continual cash returns from our herds. I have an address written out here and may as well read it in case I forget it later on. When we consider the immense capital invested in the farms of Ontario, and are told that for the last four or five years the income of our farms has not been enough to repay the labor and other expenses employed to conduct our farming operations, to me it is apparent that no other branch of industry could have withstood such a lengthened period of adversity. Had it been possible for us as farmers to have withdrawn our capital from this line of industry our numbers to-day would be largely on the decrease. But this change with us seems almost impossible, and from the very necessity of our situation we continue a branch of industry yielding a loss, *i. e.*, if the market value of our labor is considered. Admitting those facts to be substantially correct we must next admit that there is something wrong in the manner in which we conduct our business or some other cause for this bad state of things. We are told by some that to succeed as farmers we first must abandon many of the luxuries of life that we now enjoy; dispense with fine clothing, fine carriages and return to cheaper modes of living. By others, we are told that to succeed we require more protection, that cheap corn, oats, other grains and other farm products be excluded from competition in our markets. Now, we have somewhat abandoned our luxurious modes of living and to a certain extent have tried protection, and, not yet having obtained a better position in the field of labor, it is high time we changed our line of action in some respects. The dairy and its products being the object of this meeting it is to be hoped that our discussions may tend to knowledge in this particular line. At our annual convention in Guelph on January 17th, 1888, I gave an address on the silo and ensilage. 1887 was my first year growing ensilage and at that time I believed and advocated the introduction of ensilage to our farms as being one of the most important steps in the direction of success. To-day, after four years practical experience, I again call the careful attention of those present, and also the farmers of Canada, to this method of providing cheap and good food for our herds. The last four years have borne testimony to the correctness of my assertions. I claim the honor of being among the first, if not the first, to construct a silo and continue the same in practical use. I need not enter into a detailed statement as to the best methods of construction of the silo nor give directions as to the growing of corn feed, this information, given by me to the farmers of this country in 1888 being practically correct, experience having proven most conclusively to me that no farmer can afford to do without the silo for a single year. The time has gone by when it is required to show that ensilage is one of our best foods for cattle; also one of the very cheapest. By the use of it the extent of our dairy production can be increased tenfold and even more than tenfold beyond our present production. We as farmers in Ontario have now a wide field opening to us, and it now is time that we avail ourselves of the opportunities set before us. Let us be quick to abandon pursuits in our business that get for ourselves loss, and quick to adopt some branch of our calling that will result in a gain. With the use of the silo and careful attention to the details of our dairies we can, and surely will, succeed.

Mr. Sprague, in supplementing his paper, said: Almost any farmer is aware how he can construct a silo, although I warn all those who attempt going into this arrangement to carefully observe the modes of growing and harvesting the corn feed for ensilage. I think there has been a tendency to carelessness in this respect. I know of one silo that was built in our vicinity on the "cheap," and a large quantity of silage was spoiled. We have no more apprehension as to our silage keeping than we have with regard to our hay when it is got into the barn properly cured. There is no doubt about it whatever; it is a sure source of cheap food. The cheapest source of production is the one on which you have got to depend. These observations should be by us well attended to. There is no doubt that this country is well adapted for the growth of corn and many other cheap foods—particularly corn; and we are highly favored as a dairy country. Now, my friend (Mr. Moyer) objected to winter dairying, and said that our butter then would lose its prestige in foreign markets. We all know that September, October and November butter is always very fine, and by good feeding and proper ventilation of the stables we can produce good milk through the winter months, and if we get the milk, we have men who can make the butter. We have in Ontario, men who can make as good butter as can be made anywhere in the world. We may make not so much of it. But we have an idea in this country that we want a good cow to make beef when she gets too old for milking. Well, she will not make good beef. There is a good deal of the butter made in the dairy just about right to fry that beef in, and when they are both fried they are not worth much. (Laughter.)

Mr. HUNTER.—I would like to ask a question. At the outset, Mr. Sprague said that in buying his milk it cost about ten cents a gallon; that would be a factory gallon. Do you apply any test as to the percentage of butter the milk is composed of as the farmer offers it?

Mr. SPRAGUE.—We take it generally as it comes. However, we are careful to observe the quality of the milk.

Mr. HUNTER.—You would not give more for milk containing four per cent. of butter-fat, than for that containing three-and-a-half.

Mr. SPRAGUE.—Oh, yes.

Mr. HUNTER.—Coming back to the silo, we have got to feed cheap food before we will have anything for our labor, and though I am fond of a little work, I like to get paid for it reasonably well. Would you be pleased to state about what profit that butter you realise twenty-five cents for left, after the labor and money expended on it?

Mr. SPRAGUE.—I could not tell you exactly.

Mr. HUNTER.—Will Mr. Sprague's son tell the yield of butter to the hundred pounds of milk?

Mr. MARK SPRAGUE.—Five pounds and one ounce to one hundred pounds of milk.

Mr. HUNTER.—Leaving that point, Mr. Sprague passed over the method of planting corn. He spoke very strongly and emphasised the condition of corn cut for the silo. There are a great many who do not know how to plant to get it to grow profitably for the silo, nor how to put it into the silo.

Mr. SPRAGUE.—I hardly thought it would be necessary to deal with that. I took for granted that you knew how to fit the land. You all know the kind of soil.

Mr. HUNTER.—Bear in mind that each of us has a different soil and we cannot just change that.

Mr. SPRAGUE.—You all understand very well where you can grow corn. We do not change our field annually. We have grown our corn for ensilage on the same field from the commencement.

Mr. HUNTER.—What is the method of planting?

Mr. Sprague.—We fall plow. In the spring we gang plow when nearly time for planting; pulverise the soil well; and use an ordinary seeder, using two drills set from nine to eleven inches apart. We plant in rows north and south, and use about three pecks of corn to the acre for seed. As soon as that corn is up we cross drag it a little. Later we cultivate it and continue cultivating until the corn becomes pretty large. That is the process of our growing corn. I was of the opinion before we commenced growing ensilage, that a single crop of corn upon it destroyed the productiveness of a piece of land, but my experience is that our soil is in better "tilth" than ever before, and last year we raised the largest crop we have ever done except the second season after we commenced. That was a season when there was a large amount of rain.

A Voice.—Did you manure the land each year?

Mr. Sprague.—We started on that principle; we manured the higher parts of the field three years; we drew out the manure in winter and put it in the field about where we wanted it and spread it. We could not produce enough manure to cover the whole field; but even where there has not been a single load of manure the corn has been very good.

Mr. Moyer.—What is the idea of growing on the same soil all the time?

Mr. Sprague.—The principal reason is, that the corn crop is a pretty heavy crop to handle, and the nearer you can grow it to the silo, the cheaper it is to harvest; therefore, we use the nearest fields to our silo. Another reason is that seemingly that field has been in better "tilth" for corn than any other, being more porous and open; and again, there is another reason, less cultivation through the summer will do.

Mr. Hunter.—How many acres do you usually sow?

Mr. Sprague.—The first year we had thirteen acres, but we put four acres into field corn for fear the ensilage would not succeed. The second year we used the whole field and had so much corn that we could not use the whole of it.

Mr. Hunter.—How many head of cattle had you?

Mr. Sprague.—Thirty-five head over winter.

Mr. Hunter.—Is there any grain given to the cattle?

Mr. Sprague.—Well, if you are milking a good deal you give grain. You must not run away with the idea that you can do everything with ensilage.

A Voice.—What kind of a soil have you on the field?

Mr. Sprague.—There is a limestone, gravel knoll on one part of the field; small clay knolls on another part, and then on the other part a black loamy soil. We find corn grows well on the whole field. Prince Edward is a fine corn county.

Mr. Isaac Hilborn.—I have been a convert to the silo and have just tried it this one year. Wouldn't it do just as well to plant east and west?

Mr. Sprague.—We planted three seasons north and south and then east and west for a change. Have the corn so that the sun can get nicely in about the ears. I found that during showers the corn seeds were sometimes inclined to run down the gullies when planted east and west, part of the field being a hill.

A Voice.—What kind of corn do you sow?

Mr. Sprague.—Except the first year I never sowed anything but Mammoth Southern and Red Cob Ensilage.

A Voice.—I do not find my ensilage in good condition. It comes out of the silo acid.

Mr. Sprague.—There is a possibility of making two kinds of ensilage; that is sweet ensilage and sour ensilage. Sometimes it is soured by making it too green, and then another cause is that we put it in too fast and too large and do not allow it to acquire the proper temperature. What I mean is that the corn heats of its own natural action.

The PRESIDENT.—The point is how to plant this ensilage corn. A sandy loam is the best soil if lumped with plenty of manure and when so advantageous as to have ashes spread them and change the field each year. Have the corn three and a half feet apart, the kernels dropped in the drills eight inches apart, taking eight quarts instead of three pecks to the acre of corn. First cultivate with a harrow. If you plant lengthwise of this room you would go cater, with the teeth of the harrow a little back slanting. The next time go back the other way and keep on doing this until the corn is about four inches high. Then take the cultivator, going lengthwise. It keep the crows out of the corn, and the boy out of mischief. (Laughter). And it raises the greatest crop in the world—thirty tons to the acre. Then get it to the silo when nearly matured—when the corn is perfectly glazed. It will make sweet ensilage, just like a bottle of preserves which our wives and daughters know so well how to put up. In the feeding of your cow, supposing hay is worth $8 and ensilage only costs $1.50 you at once have a considerable saving, and along this the line of profit lies. Don't hang on ten or fifteen years to find out about this matter. We tell you that we know that you can raise thirty tons to the acre; we tell you that it will make more milk food in conjunction with other foods. What you want is some ensilage corn; a grain ration; and feed hay once a day. This gentleman wanted to know of Mr. Sprague how much it cost for this milk in the winter time. Now it will cost you thirty per cent more in the winter time for feed to make milk than it will to feed a dry cow. The product is worth nearly thirty per cent. more in the winter time than in the summer, and the consequence is that you get yourselves at once right in line by having butter to sell when everybody has not got it to sell, and you have not got so much to sell when everybody has got plenty of it to sell.

Mr. HUNTER.—Mr. Sprague speaks of growing his corn repeatedly on the same field and without manure, while the President speaks of changing the field and manuring very heavily. Let us reconcile these statements.

Mr. SPRAGUE.—We all must admit that the better land is manured the better the chance is for a good crop. At the same time I maintain that we can grow on the same field and get a good crop. We have instances where people have grown it for thirteen or fourteen years, of course putting on the manure. The quality is in the soil for growing corn.

The PRESIDENT.—The idea is the cultivation of the soil. We summer fallow a great deal. I do not believe in it, you know. Summer fallow by means of this corn crop. Keep the boy going and if he sees the farm growing in value from time to time, and, through cultivating the soil getting enriched, he will begin to take an interest in the place.

ENSILAGE CORN.

Professor ROBERTSON was received with applause. He said: I am very sorry indeed that I was not here when friend Sprague was giving his address on corn, because any man who has gained very large practical experience is able to express an opinion of much service. I will likely cover some of the same ground, and I want to speak very compactly and touch only some of the main features which present themselves to my mind. This chart was made to represent the results from growing corn at the farm near Guelph, so you have it suitable to conditions around Berlin. I want to say that the farmers of Ontario should grow corn because it is a very hardy plant, because it is subject to very few diseases and because very few parasites attack it. You cannot cite any other plant that is so free from these ailments and attacks.

Varieties vary as to height of growth. Some of them are two feet high when matured; some are seven feet, and I have seen corn growing to all heights from two feet up to eighteen feet. The stalk may have any number of joints or nodes, and it may grow an ear at any node, or may have three or four or five or seven on the same stalk. The ears themselves always grow an even number of kernels. You can always divide the number by two; I have never saw thirteen or fifteen, although I have seen up to thirty-two around the same cob. Just a word as to selection. On the Brandon farm this year we had planted rows of Squaw corn. You know the Squaw corn has white kernels and red kernels and variegated kernels. The yield from the white kernels was twice as large as that from the red grains of the same corn. From this point, by a careful selection of Squaw corn, it may be learned that growers can raise Squaw corn eight feet high and have early maturity. I need not detain you longer upon that aspect of the question.

Let me come to another practical aspect—the question of the soil and its preparation. Now, if you can make a crop mainly feed where no other crop can get its food then that does not exhaust the productiveness of the soil. If you have a crop of wheat and a field of oats and barley, all of which feed near the surface, and then grow corn which feeds down lower, it will loosen the soil below and take little from the soil at the surface. If you take the roots of the corn plant, by washing the soil from the fibres and having them measured, you will find that these fibres are very often from fourteen to eighteen inches long. Thus, because it feeds deep, it is not an exhaustive crop in the ordinary farming sense. These fibres loosen the soil by digging down through and liberating more of the mineral matter.

The best way to prepare the ground for receiving the corn crop is to plow very deep in the fall, that the frost may act to liberate the particles of soil. Then cultivate early in the spring, because that will kill the weeds, and corn must have clean land to do its best. After an interval of ten days cultivate again. Another interval of ten days will give you a fresh crop of small weeds. Then give the ground another cultivation, and in ten days it will be ready for the seed. I would put back the planting three weeks, and thus I would keep my field clean and in better shape for the following crop. Plant the corn in drills from three to three and a half feet apart. I would drop the seeds four inches apart in the drills, and would take eighteen to twenty-five pounds to the acre. I have sown fourteen pounds, but still I think I have got better results when I have sown rather more. After the plant is high enough to shade the soil it still requires to be stirred up. If loosened it acts like a mulch and breaks the capillary movement of the water from below. I like to have the corn wide apart also for the sake of getting a larger growth of leaves. A good many men have said that the leaves do not contain much nutrition for animals. I notice, however, that they eat the leaves first. When I come to give a theory for that there are those who say that a man who is theoretical is not so strong as a man who is practical. If he has a safe, sound theory and understands what he is doing, then he can with more safety assure himself of the right way of doing it. It is a good thing when a man can render a reason for the faith that is in him, and also for the practice he follows. Then I find the green coloring matter is the peculiar principle in plant life which secretes the carbon from the atmosphere, and the broader and more healthy the leaves are and the darker the shade, the more carbon they will appropriate from the air. Well, if the farmer can get carbon in this way it does not cost anything for the support he gets out of the air. He can never appreciably lessen the store of plants. Leaves are most active collectors of the valuable constituents. By analysis of one hundred and sixty stalks of corn, grown at the Ontario Experimental Farm, we found that nearly one-half of the nutritive properties rested in the leaves, one-quarter in the stalks, and one-quarter in the nubbins. For that reason I want abundance of leaves. As to the stages at which the corn plant should be cut for filling the silo; first of all let me say this: I find that when you grow it broad-cast you can often, in a moist season, get a rather heavier weight to the acre, but the weight is largely water. Then the man who grows corn broad-cast will find that he has the most trying crop to harvest that he ever found within the fences of his fields; and the man who will harvest such a crop in an average of seasons in Ontario will have to bite his lips or say something he does not want his wife to hear. (Laughter.) I find that when you get the corn in rows, it is neither so tiresome nor expensive to harvest. Now as to the stages at which the corn should be cut. You have the stages of tasselling when the tassel or plume comes through—the silking stage. Then you have another stage. When the kernels begin to have the juicy quality of the milk stage.

When the juice becomes gummy, you call that "the late milk stage," and after the glazing period, you call that "the ripe stage." The very best stage to cut corn is at the glazing stage. If you cut it before, it does not acquire all that it would take unto itself. Its structure is weak. As ensilage it becomes acrid and partly sour. For both reasons therefore, let it reach the glazing stage. Let me give you the exact amount of nutriment got from corn cut at these two stages. In one field, corn of the King Philip's variety was cut "at the tasseling stage" on the 30th of July, and yielded nine tons to the acre. The second was cut on the 9th of August at "the silking stage," and it gave twelve tons seventeen hundredweight, the next was cut at "the milking stage" on the 21st of August, and weighed sixteen tons six hundredweight; the next at "the glazing stage" on the 7th of September, and it gave sixteen tons two hundredweight; the next at "the ripe stage" on the 23rd of September, and it turned off fourteen tons four hundredweight per acre. In the above that cut at "the milk stage" gave the greatest weight, sixteen tons six hundredweight. Let me show the solids of these stages. At the tasseling stage it contained ninety-one per cent. of water, at the silking stage eighty-eight per cent., at the milk stage eighty-five per cent, at the glazing stage seventy-seven per cent,, and at the ripe stage seventy-two per cent. So, while there was less weight to handle at the latest stage, there was more substance in the crop and it had more feeding value. After all when a man is growing a crop he is not after water for his cows that he could give them more easily through the pump. (Laughter). People have ridiculed feeding turnips because they have so much water in them. Well now, they have a great deal of feeding value, mainly because they have a stimulating principle. People say stimulants are of no value. The turnip has an effect which has a peculiarly stimulating action upon the cow's digestive system, but still I would not water the cows with a corn crop. With respect to these experiments, there were 1,619 pounds of dry matter per acre at the tasseling stage. Then at the silking stage, there were 3,078; and at the milk stage, 4,643 pounds; at the glazing stage, 7,202 pounds, and at the ripe stage, 7,918 pounds to the acre. So that the value of the crop is not to be judged by the weight of the green plants.

Let me show you another matter. A corn crop was treated in three ways. Part of it was not matured when it was put in the silo; another part was put in the silo when in the glazing stage, and the third part was kept in the field in stooks. Now three animals were fed on these three different preparations of corn. Two men stayed with the cattle night and day, and saved all the voidings and put them into tanks. Analyses were made to see what was kept by the animals. This was not done at our station, however, but at the New York experiment station. Now I might analyse saw-dust, and find that it contained so many carbo-hydrates that it would seem to be just what the cow wanted, but the cow would pass it by. Now in these three treatments, the animals digested of the ensilage put in an immature stage sixty-six pounds out of every hundred pounds of the solids. That is, thirty-three pounds per hundred pounds were voided that the animals did not digest. Of the ensilage put in in a more mature stage they kept sixty-nine pounds per hundred pounds of solids eaten, and of ensilage cured in the fields, they kept sixty-two pounds per hundred pounds. So that the animals digested the larger proportion of the corn when put in the silo, and of that put in the silo they digested more of that which was put in a matured state than of the other which was immature. Everything points both in science and practice to the beneficial effect of growing the corn till it comes to the glazed stage. But let me say just a few things more which will help you in your practice. I find this, that if put in the silo direct from the root without any wilting or drying, that the acid formed is lactic acid and smells like sour milk, and that is why some ensilage simply stinks. Now if the corn be allowed to wilt for one or two days, a peculiar fermentation is started. That is the first stage of hay curing. You can all smell that delightful aroma that floats across a hay-field after it is cut down. It has nothing offensive whatever. Where lactic acid is in ensilage, it is apt to start a sourness in the milk because the atmosphere becomes filled with the germs that make lactic acid. It is a fermentation starter, and for that reason the people blame the silo, when merely a little thing has not been attended to—to have the corn plant wilted. If grown to near maturity and then wilted and filled into the silo, and the sides and corners trampled, you will have good ensilage every time; and every cow fed will give you nearly one-third more milk on an average than the same cow fed on dry food all winter. People do not think that this is an important thing. We have been feeding in a way not merely expensive, but in a way that thwarts the animals from giving us the largest results next summer. Let me say this in conclusion to these remarks. I put it this way, that if you begin by having more stock on the same land and the land is abundantly manured in a favorable season, you may get 30 to 40 tons of corn to the acre—but *that crop* is hardly within the reach of every man. But every man under ordinary conditions can get sixteen tons to the acre of those kinds of corn that will ripen. That will enable him to feed four cows all winter from each acre. If a man has a hundred acres of land he should keep twenty-five cows. Now six and a quarter acres of corn will winter twenty-five cows. If he wants to keep more cattle, let him put on more acres of corn and keep more cows. Every acre feeds four cows during the winter, and the manure makes more corn. I do not know of a better practice than to begin growing corn and having a silo, and then adding to that practice, the making of milk the year round by having cows coming in in the summer, winter, spring and fall, and having an income the year around and raising stock the year around.

Mr. E. Miller (Brockville).—What kind of corn would you recommend?

Prof. Robertson.—First of all on general principle, I would get a corn that matures early. Pearce's Prolific will mature anywhere in Ontario; the other varieties are King Philip's, Flint, Thoroughbred White Flint, Longfellow, Wisconsin White Flint, Michigan White Flint, Minnesota White Flint, and Selby's Pride of the North. Pearce's Prolific does not yield so much to the acre, but it is the earliest to ripen of all the common corns I know.

Mr. Hunter.—I understood you to speak about wilting corn for a few days previous to siloing it. Supposing you were caught in a frost, what would you do then? Have you ever had experience of adding moisture in the silo?

Prof. Robertson.—I have had no experience of adding water. I once had corn frozen very badly but put it into the silo before it was so dry as to need moistening. If too dry I would add water. I have never seen ensilage without some acid, but I have seen some with acid that smelled nice. The difference is whether the acid is ascetic or lactic acid.

Mr. Hunter.—I have had experience and met with the best success, but by your reasoning that dry corn should have had no acid, and I have found just as much acid with dry corn as with moistened. I siloed it and my cattle are eating it just as well but I do not think it has the same feeding value.

Prof. Robertson.—Why don't you think it has so much feeding value?

Mr. Hunter.—I do not think the yield of my cows is so good as what they have given when it is not soured so much. We will be overtaken by an early frost now and then. It is a mistaken idea to think in that case the corn is worthless for feeding. You need not look upon it as first class food but it is much better than attempting to feed out of the shocks. In case of not being able to get access to the ensilage from the top of the silo would it be possible to commence at the bottom and cut a passage through the ensilage without injuring it to any extent?

Prof. Robertson.—Wherever air is admitted on its face we have mildew of from two to six inches.

Mr. Hunter.—I understood Mr. McMillan to say that he was feeding in that way and his ensilage took no injury.

The President.— It will injure.

Mr. John Fennel.—Is it ever proper to keep the ensilage uncut? Will you be good enough to give us any information respecting clover as an ensilage?

Prof. Robertson.—We have always felt that if we put it in uncut it would be at the expense of the contents. It has to fit close where the butts are or the air will get in and destroy it. The corn stalks if put in whole must lie in a uniform direction or they won't fit. Then it is not so handy to take out the corn stalks. At present I have no experience with clover ensilage. It is sometimes fed to swine with advantage.

The convention then adjourned till eight o'clock.

EVENING SESSION.

At this session the President gave up the chair to Mayor Jansen. The addresses and discussions were interspersed with music by an orchestra and the German Glee Club, whose efforts contributed to the enjoyment of the large audience.

Mayor Jansen repeated his welcome of the morning to the Association. It had been correctly stated, he thought, that agriculture is the foundation stone upon which all other industries of this province must rest. If the farmer is prosperous the merchant and manufacturer cannot be otherwise.

The Mayor elect, Mr. J. M. **Staebler**, was called upon, and in felicitious terms joined the retiring Mayor in extending a welcome to the Association.

The **President** replied in appropriate language, thanking the gentlemen who had just spoken for their cordial and hearty reception. He said that in the prosecution of their duties as an Association they experienced very few things that were pleasant. The talk all the time was about the poorness of goods. They were here to-day for the purpose of talking to the people as to the means of putting more money into their hands and in this way help the general prosperity.

THE DUTY OF FARMERS.

Mr. E. W. B. **Snyder**, M.P.P., was next introduced. He said this dairy industry was a question which ought to be a subject of more reflection. I may say that in listening to the several professors who addressed you this afternoon I was very much pleased to hear them discuss the question of our creameries. There is no doubt in my mind, after listening to what they have said, that a very great improvement can be made in that direction by our farmers, and I think I can say on behalf of these farmers that they can say the same. Now, when matters of this kind are discussed, and discussed with advantage to the people who are directly affected by them, then of course it must lead to an advantage to the community at large. It appears that the creamery business so far in our country has not been so successfully carried on as might be desired, and for that reason apparently our governments have interested themselves in trying to educate our farmers in this direction. There is no doubt in my mind that so far the subject has not carried the weight that it really deserves, or that it should have carried, but I believe the more the matter is brought before the people the more interested they will become and the more they will study up; and in fact it is necessary to study at present. The farming community we know are not in that state of prosperity we would like to see them. It is not owing to the creamery alone, but at the same time when a matter of this kind is discussed, being of such importance, our farmers should take an interest in it, and I am glad so many of our farmers are apparently taking an interest in it and are coming out to establish it. Living as I do in the village of St. Jacobs, where a creamery has been in existence for some years, I have taken more interest in the subject than I would have done had this not been the case. In 1882, I think it was, a company was organised for carrying on the business. Prior to that a company was trying to run a butter factory and cheese business in connection with it, They did not make a success of it and the farmers took hold and formed a joint stock company; but the difficulty apparently is that the farmers when they join together seem to lack enthusiasm to carry on a thing of this kind to success. At least our experience was that the business was lagging along and doing a fair business for two or three years, and then they concluded to sell out again, and I understand this creamery was sold out quite recently. To farmers from that neighborhood I would say, you should put forth better efforts, in fact now that you were doing for yourselves you can plainly see that you were not able to make a success of it. When you see other men taking hold of the business and making a success of it help it along as far as you can. This is not the only creamery in our county, and possibly there are not many counties where there are as many as three creameries, and the fact of having three creameries established here shows that some interest has been taken in the matter heretofore. Well now, none of these should be allowed to go to ruin again, because it has been shewn by speakers at this convention that the creamery can be made a paying business. If they can be established, I hope that the farmers will give their assistance and make the industry as successful as possible. A creamery business of three factories such as we have at St. Jacobs, ought to be able to make an output of from thirty to forty thousand pounds a year. If a better product of butter can be made in the creamery than by the farmer, he is just merely wasting labor and money by continuing the old system. That is a matter which ought to be prevented, and I think, if people will only allow themselves to be educated in the proper direction, this money can be saved.

One subject that was brought up and discussed considerably this afternoon I thought was of very much importance to our farmers, and though, no doubt, a number of them had heard of it before, they are not working in that direction; that is utilising the fertilising powers they can draw from the air. I suppose there are very few farmers who have given that subject the attention it deserves. I take it that a very large amount of fertilising matter can be drawn from the air and utilised without any cost to speak of. It is not a matter that requires to be understood. There should be no difficulty about studying it out, but by the growing of certain crops the farmer should in that way so utilise this fertilising power that he can steal from the atmosphere so very cheaply. It is really too bad that such a valuable assistance should be left lying dormant, so to speak. There is no doubt in my mind, from the way the discussion was carried on this afternoon that in a great many cases farmers are making a serious mistake and losing money and labor just through lack of knowledge. Now, when our Government are assisting you in this way, by sending out men to discuss these subjects who have made them a life-long study, then surely the farmers should not be derelict in their duty. If the farmers do not choose to take advantage of these things, then they cannot blame the Government for an expenditure without any fruit in return for it. I do not believe that any money should be spent without bringing forth fruit, but it lies with the farmers themselves whether they will avail themselves of these opportunities, or whether they will allow them to slip by without getting any benefit. The farmers now require, and should be assisted, in all possible ways that the Government can aid them. At the same time the Government may aid them probably too much. They may aid them so much that the people will not relish it so much as they should. If there is too much given to anything, why, of course, it falls flat. But I do not think that our people consider that there has been too much money expended in this way. I, for my part, think that the Governments are fully justified, and I think the people will bear them out in going on expending money as long as it bears its proper fruit. I have not made it my study, but I know this much, that if worked up, the same advantages would arise in this as in any other business. I remember, when a young man, I happened to strike on a certain line in my own business that was quite new at that time, and launching out on the views that I then held, and that I thought were right, and being one of the first of those who went into a certain system of mill-working at that time, we had the advantage of all others. Now, this is a question that has advantages in the same way. If you start it in advance of other sections, you can reap the cream of the business, but if you allow yourself to lie low and others to get ahead of you, of course, you will have to be satisfied with the poor results that you will achieve. (Applause).

THE BUTTER TRADE AT HOME AND ABROAD.

Mr. Moses Moyer was next called upon, and said: I am sure there are a good many reasons why I should feel proud. One is that I have the honor to address the people of my own native town, which has been spoken of so highly to-day. I am now living in the best city on this continent; at the other end of the business which I have been doing here. Those that are acquainted with me know what part I took in this dairy business years ago. One particular friend of mine once stated that he believed if one of my veins was opened up butter would run out of it. (Laughter). I was then in a country store taking butter in exchange for goods. I have handled it as a storekeeper in exchange, and am now at the other end handling it out for the consumer's table, but before I got to the other end I had to learn a great deal, and I have learned a great deal more there, and I would just like if every farmer in this country could serve an apprenticeship of six months in Toronto "dishing" out the butter we get, for I think it would result in the greatest improvement of anything that could be introduced. When I was taking in tons and tons of butter here and a customer wrote me from Toronto for choice butter, I had very often to say I hadn't it. I looked upon this as a business that had to be remedied, and I worked in this direction until I had lost nearly all my money and heart too. However, when I come around and see people taking up the matter just about on my line, only with some improvements, I think my time was not lost. So I suppose through my work the country has been paid, whether I was paid or not.

I always held the opinion that butter could be made best in the factory, as well as cheese, and I am of that opinion still. You all remember what a terrible time we had getting the cheese industry started in our country. Factory after factory failed, and only years of struggling brought it success. To-day we stand first in the English markets. Why can we not do the same with butter. I am thoroughly convinced that we can make as good butter as is made on the face of the globe. My principal difficulty when I first started the creamery business was that I could not get a sufficient support from the farmers to make it pay. So many held back and let me do the experimenting to see how the thing would work and then if profitable they would come in. That was like the story of the boy who was told by his mother never to go near the water until he first had learned to swim. (Laughter). How could I make it profitable if I had to go all over the county of Waterloo to get as much cream as I should get from three or four farmers. That was one difficulty. Another was that every farmer thought he was making butter so good himself that it could not be improved. It is natural only to suppose that what I have is better than what some one else has. I found that every woman in the country made the best butter, and that led me to say what I did say to-day that the butter that is not very good is not made by any body. (Laughter). A great difficulty was that some cream was better than others. Experiments have been made since which have overcome this, but the greatest difficulty at first was to know whether you were getting cream or milk. When it came to the factory we often found that we had really got more milk than cream from some, while others who sent good cream were not satisfied in getting the average prices. We have now a system by which we can tell the quantity of fat contained in the cream. Now, when that can be done, and everybody is paid according to the value of his cream, the creameries are ahead of the cheese factories. The cheese factories pay for the milk on an average. Now, we all know there is a great difference in milk. We know there is milk where seven pounds make a pound of cheese and other milk where fifteen and eighteen pounds won't do it. The cheese factory system is like the story of the sailor who went across the ocean. He was told when he went over the first time that any one who brought a boat over safely was entitled to a suit of clothes. He got the suit and put it in his bill. The owners asked him what that was for, and he said, "Well, they told me over there it was the custom. That the captain always gets a suit of clothes at the expense of his employers;" but they told him "they could not do that." The next time he put in a little here and a little there in his bill to make up the amount of a suit of clothes, but did not mention what it was for. They said "It was all right now." (Laughter).

If people don't see a thing, they are easy to please. I would like, however, that the creamery business should be started all over the country, and what I said before dinner was, not that I am opposed to winter dairying, but that I am opposed to this, that the cheese business should receive all the encouragement through the summer, when milk is the best, and then the butter-making should be taken up in the fall when the milk is not so good, because I think it will have a tendency to keep butter down as flat as possible all the time. It has been said by one of our speakers to-day that he can take five pounds of butter from one hundred pounds of milk. I always counted twenty-five pounds of milk to a pound of butter, and even with that proportion butter-making pays fully as well as cheese-making. It has been proven that it pays you better, and that it saves a great deal of work for your women who are overworked on the farms to sell your cream than to make butter yourselves. Make your homes comfortable and let your butter be made up in creameries where they have the appliances to make it much better than you have at home.

Well, as I said, now I am down in Toronto selling to the consumers. Since I have been in Toronto I have learned more of the quality of butter than I could possibly have learned anywhere else. Little children come to the store and nine-tenths of them know more about butter than the farmers throughout the country. Farmers get used to their own butter, and think it is all right, but we sometimes have a dozen different qualities, and by comparing and tasting it, the customers get to be such experts that it is easy for them to tell the quality. Why, sometimes I have seen farmers come in with butter and with a smile give me to understand "there is something good, now." I don't like anything better than to put their butter on the counter and wait until some of my customers come in and in their presence say, "I don't like that." It almost "takes the wind out of him." I say only about one pound out of every hundred pounds we dare offer to the best of our customers. Good judges of butter can tell the extra flavor of butter as readily as an artist can point out a beauty in a picture of which you never thought. That is where butter making becomes profitable ; just when you learn to put on the best finishing touches. We put down butter that we know is from the best makers, and we give twenty-three cents a pound and it always goes first, and we have butter we are paying five and six cents a pound for and cannot move it. Nobody wants it. There is the milk produced by the honest cow made into that stuff. Why it would make the cows cry if they could see it. (Laughter). It is something abominable, and if the farmers won't stop it, I hope the Government will put a penalty on those who send to the city such butter and offer it there. We handle different things there. Sometimes apples are sent down. Now, a farmer goes to work and plants a tree and after it bears fruit he will shake the apples down because it is too much trouble to pick them. After taking care of the trees for years, in order to save a few hours time, he will send them down to market to sell at half price? After the expense of raising a cow, to save a little time or extra pains the butter is to be sold at half price. Is that reasonable?

Now, I would just say a little about the market in England. We have no market there for butter. Why? Simply because we sent them such miserable stuff, except the creamery, which is so little that it did not amount to anything. You hear people say that they are afraid of over-stocking the market, but there is no danger of that. The more cheese we make the more seems to be wanted, and so it will be with butter if we make it good. At the table to-day at noon at the hotel I was ashamed of the butter. (Laughter). I thought that the people of Berlin would get the very best butter that could be bought for this Association, and at the table I sat to-day three of the members turned up their noses and never touched it. I am ashamed of that. I thought the people of Berlin would give them something nice and I know if there is any good dairy butter made in the Dominion of Canada it is made by the farmers in the county of Waterloo, but to-day they gave us miserable stuff.

The German butter stands very much the same in relation to our home market as the Canadian butter does to the markets of England. While I say again, some of the finest butter in the Dominion is made by them, there has been enough wretched stuff made by them to get the credit for making all the bad butter, which is commonly styled "Dutch butter." All the bad butter in England is "Canadian butter," even if it had come from China You see therefore, that you can get a bad name through your neighbor, and the importance of your assistance in raising him to your level, which can only be done by the co-operative creamery system. It is a mistake to suppose that you get more for your good butter, if others make it bad. Every pound of poor butter has a tendency to pull down the price, and when butter is sold at 5 and 6c a pound, every farmer, to some extent, will have to suffer. Look at our cheese market. Since all its cheese is made good, we make ten times as much as we did a few years ago, and yet it is all wanted. As the quality improves, so the demand increases. This also holds good in butter. So many farmers feed turnips to their cows, and when they do that, it is impossible to make good butter, and for the little butter they make more, it does not pay, as it depreciates, the value at least five cents a pound. It is encouraging to see so many farmers attending these meetings, it shows that they have made the discovery, that they can learn something about butter-making. A few years ago they knew all about it. Prof. Macfarlane told us to-day how the skilful take plant food out of the air into the soil. A few years ago we found out that we can utilise electricity. It has always been around us, but we did not know how to use it, and so there are many things within the grasp of the dairyman, which come to his assistance to make dairying profitable, if he only opens his eyes and looks for them. This is, I think, the best attended meeting the Creamery Association ever had, and I hope the good seed which has been sown, will bring forth the best fruit. (Applause).

Mayor JANSEN.—In reference to feeding turnips to cows, I can corroborate that statement of Mr. Moyer's. I have sometimes tried to make myself believe that I could not taste turnips, but my wife invariably afterwards said she tasted them in the butter. I think Mr. Moyer is quite right, that it is impossible to feed turnips and at the same time get good butter. I was raised in Wisconsin and had more or less experience there of these things. I do it on a smaller scale now, and manage to keep but one cow, and invariably in the winter time have better butter than in the summer, and it is all because we have a kind of feed that makes the highest class of butter, and what we usually feed is corn stalks and carrots—not the common white field carrots; that is not the article for first-class butter; you want the table carrot. You will grow just as much of it as of the other if you go to work right, and when you get a bushel of it it is worth three bushels of the white carrots for butter purposes. Now, in fact you not only get a high feed, but also a coloring. You do not require an ounce of coloring matter in any shape or form in your butter if you feed these table carrots. (Applause).

AGENCIES FOR THE EDUCATION OF DAIRYMEN.

Prof. ROBERTSON said: I am very glad to be in Berlin to-night. I know that the townspeople are not so much interested in the dairy question, yet I want to speak of the education of farmers and dairymen, and if any good is done by what I have to say, they are welcome to put it into practice without paying any royalty to the speaker. Let me refer first of all to the educational value of the Ontario Creameries Association. Just five years ago this month the first steps were taken to form the Association at a convention in Woodstock, at the suggestion of Mr. John Hannah, who was persistent and persistent and again persistent in advocating the need for having the Ontario Crameries Association organised. I do think that the work of this Association is far more valuable to the Province of Ontario than that of others which are much more pretentiously named. We have the mayor of the Island City in Canada as our President, and I once heard him say in one of his moments of exultant exaltation that he would rather be president of this association than Governor-General of Canada. (Laughter.) My friend is always judicious in consoling himself; there was less chance of getting the other plum even if he wanted it.

This is along the line of melancholy history in Canada, that a few years ago our butter abroad had a fair name in England and elsewhere. It has not captured any markets in recent years. It is not because it has lost any of its strength. It seems to "go on from strength to strength continually." (Laughter.) Notwithstanding that, we have been beating a steady retreat from the position we once held. The history of the cheese trade is quite different. It is more than twenty-five years ago since we opened up that trade, and it has grown to be very large and profitable. I think it has won for Canada the greatest name that has been given to us in response to any of the products we have sent abroad. Why the difference? Just this, we have been continuing to make butter of every conceivable variety. The shape and size and color of the package have been assorted. People do not like too much variety in butter. In our cheese factories we have been making ninety-nine per cent. of all our cheese up to a standard of uniformity, and we have taken on an average the highest place for excellent cheese in the world. England has no customer that sends so much good cheese; and she has no customer who sends so little good butter and so much strong butter as does our Dominion. (Laughter.) No doubt if we could put into practice in our butter making what we have done in our cheese-making we might win quite a superior place. England imports from us more cheese than she imports from any other country. She takes from us one-third of all the cheese she imports from abroad, but only two per cent. of the butter.

More education, more knowledge and more skill, and the putting into practice of the advantageous methods which are employed by the cheese trade, would help us to do as much for the butter trade as they have ever done in the past for the cheese. That leads me to speak to-night of the educational value of Experiment Stations, because I believe that through them we will lead the buttermakers of Canada to make butter so excellent that it will stand first. If we can make it as good as anyone else, we can have the longest line of profit, and if so we can afford to sell cheapest, and so command the markets. There will come a time, I believe, when butter will sell in England for less than the present prices, but the present price would leave us about twenty-six cents a pound for fresh-made creamery butter. Denmark sends over twelve million dollars worth of fine butter, for which she realises that price, and there is no place in Denmark that can compare with Ontario. Indian corn from the silo, fed with bran and pease, is the best combination feed we could have for butter making.

Very often farmers think that education is one thing which they do not need, as it will not help them in their calling. One says: "Oh! education will hurt my boy; it will stunt his desire for work, and make him seek the life of an idler." Now an education that will do that is of a wrong sort. Education is for the training and development of all the faculties and powers, and such help is as necessary for a man who works on a farm as for one who labors elsewhere. A mistaken notion measures the effect of education according to the use of big words, but that is not a sign of education. The man who does that at once proclaims his lack and need of literary skill, and skill is always a product of education. I will tell you a story about that. A very learned man in his own estimation, following one of the learned professions, came to see a sick boy. This man was a doctor. He seemed to think that education was proven by the use of great long words; so he said, "Boy, extend your lingual organ." That boy was never before aware that he was guilty of having a lingual organ. But the doctor would not come down from his high pedestal, to tell the boy what he meant. The boy's mother had good sense and was educated even in the use of big words; so when the doctor said to her "Madam, will you convey to the unilluminated consciousness of your youthful offspring the meaning of my language." "Yes!, Yes!," she said, and turning to the boy, "Johnnie, Johnnie, open your goblet and run out your lollicker." (Laughter.)

Now, farmers should first of all try to do more thinking before they do their toiling. Of all the things in the world which some men seem to dislike to do, that one thing is sober, honest, original thinking. Let me shew you; somebody's clear thinking underlies every rational act that brings success, and the more a man does the thinking for himself, the more he will be able to control his business for himself. When a man stumbles along and works toward no object, he may get some money, but farming is no speculation. Then farmers need not only to do more thinking, but they require to have higher aspirations. Why, farmers go through life often and complain that everybody looks down on them and nobody has any respect for them, and that they have to bear all the burdens, that they have to pay all the taxes, that they do all the drudgery, that they are the beasts of burden for other people. I would have the farmer believe that his occupation is the noblest, in a material sense, of those followed by men who walk the face of God's earth. When a man feels respect for his calling his brother farmers will respect him and he will respect himself all the more. As soon as a man learns to do a little good thinking for himself he begins to find the dollars coming in, because then he puts himself into his work. No man can put himself into his work without getting well paid for it. A man gets a great block of marble and goes to work with chisel and mallet and says, "when the bell strikes five at night I will stop." So he goes on and does no thinking and has no aspiration. When he has finished, he can sell the whole thing for so much a ton to be broken up for paving the streets. Another man goes to work upon a block of marble and does some thinking. He starts by saying, "Is there anything I can bring out of it? I will strike with a purpose and will realise my aspiration to excel; I will bring out of the dead block a thing which will look back upon me as though it had life. If it does not reach my ideal I will be tempted to smash it into pieces as one man did because the lips which he had chiselled would not move." He can sell that statuary for any sum he likes to ask. Just as the farmer puts himself into the work and raises calves and cows and horses and gets back dollars in proportion as he applies the skill of a man. Then farmers ought to exercise more self-reliance. I find farmers saying the Government ought to do so and so. A Government can never legislate good times. You cannot find a case around the whole globe. Any good times that come in agriculture are from self-reliance and the favors of Providence in sending good weather. Self-reliance leads them to put themselves into their work by adjusting themselves to the changes that have come about. Then men need a little more self-reliance *to the very end.* I will give you an instance again. I find a man grappling with an undertaking and it is all discouraging; everything seems to be going against him, and by and by his courage weakens, his heart fails, he lets go on purpose. Such an one cannot do much. I never knew a man employed in any enterprise *that would persevere to the end,* who could not win success. There is no class who so often fail to do things right up to the end as the farmers. A farmer thinks it is all very well if he can get one cent a pound less than somebody else. It is just this little thing of persevering to the end that gains the big price and the permanent profit. With more aspiration, more perseverance unto the end, good times will come. And if an occasional poor season intervenes a man will have enough to lap over a season when the weather is not quite propititious.

Go across to Denmark and look back twenty years and you will find the people poor because farming would not pay, and they were discouraged. Somebody did something. If they could make winter butter to send to England and raise hogs and steers, that would make them money. Denmark is the most prosperous agricultural country in the world to-day, because of somebody's thinking and somebody's persistence unto the end. You wonder why I am not coming to these Experiment Stations. Now, these stations have been established for the sole purpose of directing and assisting farmers to do these four things, and then to furnish them with knowledge and conclusions which they could not reach otherwise so quickly and certainly.

Their occupation is a threefold one, a trade to handle tools; a business to buy and sell with profit, a profession to adjust themselves to the laws of nature and make these operate for their gain. We have no need to teach a man how to plow. The best place for education of that kind is at home on somebody's farm. I say there is no need for helping farmers to a business knowledge for buying and selling with advantage. The home and home training should fit every man for doing that in the best way, and the farmer who excludes his boy from doing business until he is twenty-five years old has dene his boy a great wrong. They should have their boys on the farms transacting the simplest of the business at first, and giving them experience in all buying and selling required on the farm. If the boy, the first time, loses ten cents a bushel on the grain don't be afraid to give him another chance. He will take good care not to do it again and it will be a better lesson to him than if he had made five dollars. In that way give lessons at home. But in the profession of agriculture a man needs some outside help. Let me show you how we are trying to give that from these Experimental Farms. First of all we are trying to show that nature is very generous; all the time trying to bestow blessings on her children when they follow the paths she has laid out for them. One illustration. In sowing two-rowed barley it will give you a larger yield as feed for cows when sown on well-prepared land and in good time. Last spring she gave us back for barley sowed on the 22nd of April forty bushels to the acre, and when we sowed the same kind of grain one week later, on the 29th of April, she gave us back twenty-four bushels; and of the same kind of barley sowed just one week later, on the 6th of May, she gave us back sixteen bushels to the acre; and of that sowed on the 13th of May, fourteen bushels; and on the 21st of May ten bushels; and on the 28th of May, eleven bushels. Some men complain because they cannot grow enough grain for their cows while good Dame Nature is waiting to throw it into their laps. In the same way she gave us back of oats sowed on the same dates, with intervals of one week, in the first instance thirty-seven bushels, in the second thirty-three, and the third thirty, and the fourth twenty-seven, in the fifth twenty, and in the sixth seventeen. You see how gradual the shrinkage goes on when men have not enough business knowledge, professional skill, to make nature serve them in the best way. Then besides that we are trying to show farmers how to feed in the most economical way so that the feed will cost less than the product of the animal will sell for afterwards; how to best combine the growing and feeding of crops so as to have the best value in butter at the least cost. People somehow or other don't like to pay twenty-five cents a pound for butter that has only one good object in the family, that of saving bread. (Laughter). Now, butter that is made from turnipy milk will save at least half the consumption of bread among people whose taste is at all delicate, and the effect of half the bread being saved would be that half the flour would be saved and only half the wheat would be in demand. Then the wheat would go down from one dollar to fifty cents at once. (Laughter). Let me give you another illustration showing how the improvement of our butter will help every single product of the farmer to fetch a higher price. A young man got married and after his wife had got through saying nicely buttered things to him she noticed with an economical eye that he buttered his bread very extravagantly. She said "John don't you know that butter costs twenty-five cents a pound." "Yes, my dear," he said, and with that he folded the slice and buttered the other side, "and I think it is worth it." (Laughter.) He was not going to reduce the consumption for any such reason as that.

But to show you how we do this work in connection with the Experiment Stations, let me give you a very short outline of the area we attempt to cover and of the different lines we attempt to take up. First of all you have here at the centre of the Province of Ontario, an Agricultural Experiment Station in connection with the Agricultural College at Guelph. For fourteen years that Experiment Station has been trying to shed its light out into the homes of the farmers of Ontario, and some of have welcomed its beams, have accepted the teaching and are now grateful for the help. But many of them have screened and shut their eyes while their neighbors aronnd them were reaping these advantages and they have looked upon it with suspicion because it was a Government institution. The first summer I spent at that Experiment Station I began to test the effect of salting the milking cows. They were salted every day and gave fourteen and a half per cent. more milk than when salted once every ten days. Fourteen and a half per cent. means a great deal on the herds of Ontario. Your good friend, the chairman, introduced me as being connected with this institution, I was proud to work in the dairy department there, because of the useful work it has done, and there has been appointed to succeed me at Guelph Mr. H. H. Dean. Mr. Dean's whole heart is in this work. He has been a popular and successful student, and he will leave nothing undone which he can do to make his work valuable. I hope the farmers throughout the Province will give him a fair chance, and I am sure he will render the farmers of Ontario abundant service along the line of his own department. Now we have other stations. We have at Ottawa a station called the Central Experimental Farm. There we have nine breeds of cattle; we grow all kinds of grain and grasses and roots and fruits and trees. We grow scores of things for the sole purpose of finding out for the farmers things they cannot discover for themselves. I went to Nova Scotia starting down the beautiful old St. Lawrence river, that most magnificent, noble stream. I then went up that weird river called the Saguenay. I may tell you that one man drove sixty miles to get one day's education in cheese-making. Some months afterwards I heard that he had been able to sell his cheese for one cent per pound relatively more than he had ever done before or than any other factory in the county was doing then. Then away around from there past Riviere du Loup I went down to the Bay of Chaleur and away up around to Gaspé Bay. The people from Jersey, Ireland and Scotland are making butter and selling little else but that and oats. In New Brunswick I found a few cheese factories prosperous and paying well. Across the Bay of Fundy up the Annapolis valley, the people have no cheese fectories. You know there are always laws of compensation. The finest fruit grows there and the owners of beautiful orchards have an excellent reputation for their apples. Then around to New Glasgow and down the Antigonish valley where Mr. Archibald started a cheese factory some years ago. There are now eight factories and they are building more this year. Then I came back to the Nappan Farm, and what we expect from that is to show the most skilful way of carrying on farm work including the making of butter and the most skilful way of making it through summer and winter. Then a journey was made to Prince Edward Island, that gem of the provinces of the Dominion, with its softened contour and deep beautiful colors with the soil as rich as its products, grass as green as the slopes of Ireland and a sea as blue as the canopy of heaven. It is the best place you see (except Brockville) for getting fine cheese. (Laughter). About fifteen years ago one started a cheese factory and because some people had not done enough clear thinking, the whole thing fizzled out, but now we hope to put an experimental dairy station there, and we have applications from several persons to get one summer's education in factories in Ontario. They will go back taking knowledge to those people. Then I returned to Quebec, a wonderful province. Four years ago the cheese of Quebec was sold at one cent a pound less on an average than that of Ontario, and now I can find factories that are out-selling even factories not far from Brockville. (Laughter). The Government of the province of Quebec has arranged to pay half the salaries of fifteen travelling instructors to educate the people. Then across the province of Ontario. I could show you in this province people who will persist in boarding 200,000 dry cows all winter for the fun of it. They should make butter then when it can be made just as fine in body as when made from the best June grass, and have it sent across to England. Then out in Manitoba we have an Experimental Farm doing work for that province similar to the work that is being done here. In this province with its capacity for sustaining two millions at least, we are trying to find out what things will grow and what kinds of farming can best be carried on. And far across the plains we have a farm at Indian Head. Coming across here we come to a settlement of Icelanders apparently contented with their conditions of life up there. In most of their homes there were two shelves of books —these are men who do their thinking, men who are self-reliant, men who are persevering and must always win success there or anywhere. People who are make-shifts have hard times of it anywhere. They have built a church, and have one of their own clergymen from Iceland. One said " Vell, we are almost as enterprising as the English people ; our church is built and painted outside and inside and paid for, but we haven't put a mortgage on yet." (Laughter.) So that this is self-reliance and perseverance to the end. When I was coming to this place I went up to inquire my way at a house. I could not see any curtains on the windows or flower plants. so at once concluded that no woman lived there. Then I saw a clean churn standing at the door, and I thought a man would not clean it so bright. Then afterwards I thought there must only be a man, because the whole week's washing was strung on the clothe's line—just one collar (and that barely clean), in the middle of the line. (Laughter.) After all, these people in Manitoba who have to do the dairy work themselves as well as the outside farming, are all the time crying out for creameries. The men all over that country want to make butter and cheese to be safe against the disaster of frost.

Away out here is another Experimental Farm, just beyond the Rockies. Then down here in Vancouver Island they are selling butter at fifty cents a pound the year around. So from one end of Canada to the other the people who keep the most cows make the most money, and where they keep them milking the year around they make the most money from the cows they keep. So the whole trend of the work of this Association is to help the farmer to do more thinking, to have more ambition and a little more self-reliance, and to make from his own business not merely more money for himself but help to make times better all around. I have this to say in conclusion. If any one at all wants help from these Experiment Stations, they exist for the purpose of helping the farmers. It is not counted trouble to answer letters of enquiry, and as the farmers get their eyes quickened, their intelligence enlarged and their judgment strengthened they will be fortified in their efforts to make this country from shore to shore the best in the world, and when our farmers are prosperous then everybody will have good times. (Applause).

The PRESIDENT.—I may say that I am perfectly delighted with the meetings, not only to-day but this evening. I was glad to hear the addresses. The last man that has spoken is a gem in himself, one that this great Dominion may well feel proud of. There is no man stands on the continent, no professor, that has the same knowledge in the dairy business that he is now trying to educate the people so thoroughly in. Our good friend Governor Hoard did his very best to transplant this man to the Wisconsin soil in order to educate his people in the best dairy thought of the land, but on the urgent solicitation of his friends he was induced to stay here to educate the people for this great dairy enterprise we have in hand.

Votes of thanks having been tendered to the speakers and chairman, the convention, led by the orchestra joined in singing the national anthem, and then adjourned until the next day.

SECOND DAY.—MORNING SESSION.

The President said he must apologise for the delay which had taken place in opening the convention this morning. Through the kindness of the Mayor they had been driven about the town and taken through several of the large manufacturing establishments. "We thought we could see all the institutions of importace in Berlin and be here ready to go on with the work by ten o'clock; but notwithstanding all possible haste, you see the delay that has taken place, and yet we have not visited half the grand institutions in this locality. I am perfectly surprised at the large and interesting industries located in this town."

AUDITORS' REPORT.

Mr. R. J. Graham, the Secretary-Treasurer, then read the Auditors' report, which, upon motion of himself, seconded by Mr. Robert Philip, was adopted. It is as follows:

Receipts.		Expenditures.	
Membership	$82 00	Expenses of directors at board meetings, etc.	$254 45
Balance on hand as per last audit	524 50	Expenses of instructor and salary	596 65
Grant from the Ontario Legislature	1,500 00	Premiums awarded for butter at exhibitions	175 00
		Printing account	86 00
		Reporting Seaforth convention	50 00
		Secretary-Treasurer's salary	100 00
		Postage, stationery, etc.	29 15
		Lecturers and expenses of Seaforth convention	50 00
		Balance on hand	765 25
	$2,106 50		$2,106 50

We the undersigned auditors have examined the Treasurer's accounts with the vouchers produced and find them correct and a balance to the credit of the Association of $765.25.

J. M. MORGAN, } Auditors.
J. S. PEARCE, }

Berlin, February 14th, 1891.

ELECTION OF OFFICERS.

Mr. **Aaron Wenger** presented the report of the Nominating Committee as follows:

President: D. Derbyshire. *1st Vice-President:* Aaron Wenger. *2nd Vice-President:* John S. Pearce.

Directors: John Croil, Aultsville; J. M. Burgess, Carleton Place; T. J. Miller, Spencerville; John Sprague, Ameliasburg; Robert Philp, Cadmus; M. Moyer, Toronto; Geo. Harcourt, Guelph; W. G. Walton, Hamilton; John Hannah, Seaforth; Erastus Miller, Park Hill; J. N. Zinkann, Wellesley; T. Brown, Holstein; Arch. Wark, Wanstead.

Aaron Wenger.
John Sprague.
John Hannah.
R. J. Graham.

Mr. Wenger moved, seconded by Mr. A. Miller, of Brockville, that the report be adopted, which was carried.

The President.—I take it as a great honor to be elected to the position of President again. There is no position in the province of Ontario that I would sooner have, because I believe it is the most important position that any man could aspire to. It has such great possibilities that I feel I can devote a great deal of time to the duties and in this way do something for the great province of Ontario. I thank you for this kind treatment here amongst strangers, and I shall always remember it with the greatest gratitude. I will now introduce to you Professor Robertson, who will speak to you on the subject of dairy farming.

WINTER BUTTER-MAKING.

Prof. Robertson: Mr. President, ladies and gentlemen, I have been very much gratified this morning in being driven around the streets of this thriving town of Berlin. We people, who spend most of our thought and nearly all of our time in trying to provide food for the working people who in turn furnish other things that we need, too often forget that the prosperity of our country depends not alone on the success of our farmers but on the thrift and enterprise of those men who even make the buttons for the farmers' coats, the shirts for his back, the shoes for his feet and all those other things which we have seen in process of manufacture this morning. Yesterday I told a friend of mine that the population of Berlin was about six thousand, and I felt that I had almost been stretching, but now I find you have nearly eight thousand people, and that your throbbing manufacturing enterprises enable you to make every township and county in Canada pay their tribute to you, because your goods go clear across from onr shore of the continent to the other. I want to say in this connection that the closer the bond of sympathy between people working in towns and people working on farms, the more will we be able to help one another and to enjoy even privileges. Very often the countryman thinks the townsman is a man who waits to take advantage of him at every turn, and the townsman often thinks that the countryman is a fit subject to be skinned right down close every chance he gets. When we know each other better we will be able to work together more harmoniously for the advancement of the many interests of our one Dominion. This morning I will speak to you upon one aspect which will promote our common happiness and prosperity, that of making more and better food in the winter time. The task and occupation of the farmer is to devote his talent and strength to solve these problems that face him in such a way as to bring back from nature as much as possible all kinds of food which contribute to the support of the race to which he belongs. Now, a man who follows dairy farming and provides food for the people during the summer months only is like a man who owning a button factory shuts it up for the winter saying, "Closed because the winter is cold." With all the plant idle, all the hands discharged, no income throughout the winter months he could never compete with another button manufacturer up in Port Elgin that runs all the year round. No more can a farmer in

Waterloo compete with a farmer over in Wisconsin or in England who keeps going all the year round and has an income all the year round. Now, winter dairying has nothing in itself that is hostile to summer dairying any more than shirt-making in winter has in it anything that is hostile to shirt-making in summer. Perhaps you make a different class of goods, that is all. At the same time business should run the year round in both instances. Farmers have come to this experience in their calling, that their profits are threatened with annihilation. Times are hard — there is no question about it—and times are hard upon the farmers whose occupations lasts only half the year. Times are not hard with farmers in Ontario who keep their business going and sell products in the summer time and fatten and sell steers and other stock products in the winter and spring. These men have been doing well during these past ten years when times were hard. Now, a dairyman who has no fat steers to sell can do something else. The point is, can we begin winter dairying without much further outlay? A Creamery Association is just an organisation which takes hold of this new problem and helps the farmer to solve it. A man who runs a creamery for only five months in the year will find his patrons becoming thoroughly dissatisfied with the receipts from their cows. It cannot pay a man to feed cows for twelve months from which he obtains cream for only five months; and the man who runs a creamery can never afford to make a profit out of the losses of his patrons. Put that down as a solid fact. And the man who furnishes skill and turns around and helps to make the profit of his patrons larger will get a larger share for himself. Now, if a man running a creamery will try and extend the season for a few months more he will find he will get so little cream that the running expenses will run away with the profit. You need not begin to advocate winter-dairying until you educate the farmers to feed their cows so that they will give milk during the winter. You want to begin at the foundation, educate the farmers to feed their cows so that they will give milk and send it to the creamery. Then when they have abundance of pay coming in regularly all winter, they will have money to pay their current expenses and it will not take them all summer to pay the accumulated grocery bills of winter, but they will be ahead and the summer will leave them more profit. I have said that much by way of preface to try and remove any misconception that winter dairying has any hostility in it to summer-dairying. Now, put this down as my second proposition, that the price of butter in the summer time is one factor in a farmer's business over which he has almost no control. A man, twenty men, fifty men, five hundred men, can never, by any manipulation, raise the price of creamery butter in summer by one cent a pound. But creamery butter fresh made will sell on the average throughout the winter for about a half more per pound than it will from June to September. A man has exclusive jurisdiction over that factor. He can make creamery butter from June to September and take the prevailing price then, or he can make from September to June and get the prevailing price then. Then put this down as my third proposition, that the man who lets his cow go dry for seven months of the year will get less during the other five months of the year and will get less during each of these seven months when she does milk, than will the man who makes his cows milk not seven, but ten months in the year. Men say if they milk their cows all winter they will get a smaller flow in summer. As a matter of fact, they will get a larger flow during the summer months. A cow that goes dry in the winter time that is fed upon dry food will have her system so ill-adjusted for milk-making that she will give less milk in the summer. Take these charts now. I will take the Jersey cow, not because she is the best cow, but because the ideal form is easier described on this contour. The form of a cow's body will reveal both its capacity and power for making milk to the eye of the skilful judge. She is a milk making machine, adjusted even in regard to the economical contrivance of her body for appropriating bulky food, here (the mouth) coming out in the concentrated form of milk at this end (the udder). Now, if allowed to become dry, she may not be so well developed here (the udder), and in a short time you will find that she drops off in her milking because she is not developed into the form for giving milk. In your heifers, the first season develop these parts of the body and thus make your means better adapted for carrying on your work. Let me give you the points of a cow and show how she can be assisted for the enlargement of her capacity for winter dairying.

Beginning at the most valuable one, you know a large udder is desirable and the points of excellence are first length, then breadth, and then elasticity—softness of quality. This is a very peculiar and mysterious laboratory wherein the cow changes the blood of her system into the milk she gives the dairymen. The next point to look for is a soft mellow skin. Any one knows that a steer will thrive better if he has a soft mellow skin. A man who feeds his cow well through the winter on succulent food discovers that the cow has a skin more mellow and soft and unctuous. The skin is a most important organ which goes around and through the cow's body, the only interruptions being in the stomach. The digestive action depends upon the activity of the internal lining of this canal, in pouring juice upon the food in the stomach and then in assimilating the food after it is partially digested. Any treatment that will make the outside skin more mellow, more movable, will give you a better cow. The next point is a large barrel with ribs broad and wide apart. By the use of bulky and nutritious feed you will develop and conserve the digestive power and augment its potency. A cow that lives all winter on straw will find, in the spring, that she has been reduced so much in her productive capacity by having to wrest nutrition from this straw that she has got into the habit of wasting things. That cow won't give you so much milk all summer. Then a cow needs to have broad loins and long rumps. You cannot change this, that is born in the cow; but you can do this, if you keep on developing the milking qualities of any cow, you will find that her progeny—her calves--will very soon have the long rumps and broad loins. Then you will have better bred animals for giving milk. The cow should have a rather long fine neck, fine quiet face, with large eyes. Did you ever see a cow with a short neck that milked a long time? I do not think I can ever recollect a beefy-necked cow that gave milk for a long period. The object simply is to show that a man by giving a cow some chance will develop in her just the form that will help her to give the largest possible quantity of milk for the longest possible period. It is a good practice, because it is in accordance with a man putting himself into harmony with the laws of the universe which, when he does that, will shower blessings on him every time. The cows that milk through the winter, or ten months in the year, will give more milk per head than a cow that only gives milk for six or seven months, and when a man gets more milk per head he will find that he has larger profits and then he will keep more cows. I will repeat what I said yesterday, that I think every dairyman who has a hundred acres of good land should keep, at least, twenty-five good milk cows. Now, how will he get the cows? The trouble is if he milks only in the summer time he will not raise many calves. You will find this all over the country, the man will raise the winter calf seven out of eight times. I would not advise a man who has twelve cows to buy thirteen more, but by having winter calves, if he will rear these, in three years' time he will have twenty-five cows. I would have things adjusted to feed those cows, by growing corn and filling silos. In that way I would put myself down as saying that every cow would bring me in each year, at least, $50 on an average. One man down near Brampton, for three consecutive years, by making butter and selling it in Toronto, had receipts averaging $73 per head. He had $72 one year and $75 another. This was from twenty-eight cows. He had private customers and sold at twenty-eight cents per pound. Then not merely will you have more cows for milking. Half of the calves are bull calves. Well, why should the farmer kill his bull calves when all the year around people are clamoring for beef of good quality. I remember a story of a man who suggested that the beef should be graded as they grade wheat in Manitoba. This man got a piece of an old ox and tried to cut it, but the knife and the beef seemed to be ill-adapted to each other to the end of bringing about separation. He suggested to the proprietor of an hotel that if they graded their beef as they graded their wheat this should be graded as number one hard. (Laughter.) If calves are raised through the winter they can be fattened rather more rapidly, coming into the market in capital shape when they are two years old, and the dairyman who grows lots of corn can fatten lots of steers and add income in the spring in this manner to summer and winter dairying. I want to say this also, that the man who sells butter through the winter will get for that butter *a constant demand* at a good price. He will have some trouble at first, but there is an unlimited demand for excellent butter in large centres of population. Mr. Moyer stated they were paying twenty-three cents in Toronto for butter which is adapted to the want of their customers and that they get a butter which they could not sell at five cents, or even give away. Meanwhile if we could send across a weekly shipment of butter to England, we would get the Danish prices netting now twenty-six cents per pound. In 1886 I went to the Colonial exhibition. I had some butter from the Ontario creamery. It did not get there very well, and was kept at the exhibition until it was unsuitable to be sold as first-class butter, and yet I think it sold for 108 or 110 shillings ; but a capital shipment was sent through afterwards and that was sold at the price of Danish butter, and every year since I have been asked by the firm who bought that shipment to send from three to five hundred tubs and I could charge what I had to pay to get it. There was no limit. Now one point more. It is very hard to get farmers to go into this business so I will tell you what my own view is of the best way to go to work about this thing. You will find first of all that the farmers will hardly make their cows milk through the winter and send milk to the creamery at first unless they have positive proof that creameries run in winter are to be a success in our country. Farmers are rather timid in going into anything they do not understand. If a man comes along with a first-class humbug they will go into that straight, but if a good thing comes along they are the most conservative class of our population. The farmers say, " Well, we don't know exactly how well the Canadian-made butter would sell in England ; it might only sell as second-class." Farmers don't believe that winter dairying by supporting the creameries would pay very well. They say that " we don't know that England would pay us high prices for our butter." I would like to see in Ontario, at two points perhaps, and in each province throughout the Dominion such an experimental dairy established as would endeavor to discover the best methods of making of cheese ; to find out how to solve those problems in that difficult process of cheese-making. Then I would propose to have these same buildings used for making butter all winter, and having the farmers in those sections send their milk to the factory to be made into butter and taken to England. This butter might be shipped every second week or oftener, and if at first it does not sell high I think the Government has resources enough and interest enough in the dairy business to be able to stand all the loss on weekly shipments of fresh made butter for four or five or twenty weeks until we establish a reputation in England and let the people know that our butter is excellent. The whole thing will not come at once, but when people see how this will take then I dare say twenty more factories will start up and this will become a source of influence to help the farmers throughout the country. Now I do not see why we should not do that this coming winter. If to the men whom the farmers send to Ottawa to vote their moneys, to make their laws, to help to develop the interests and resources of this Dominion they would say—" We want that, we are going to have that "—the members of parliament would say, " Yes, you will have it." We have in this Creameries Association with all the power behind it an organisation which can say " that has to come this year." So I would like to see you pass a pretty stiff resolution, if you want that, if you are bound to have it. And if you don't get it, then I suppose you will have to do as the good old woman said when she was in trouble. She said she always got some consolation when everything else failed by trusting in that promise : " Just grin and bear it for a while." Let me say a few things as to how this winter dairying presently can be carried on advantage in the farm home, because in connection with that same scheme of helping with farmers to make butter in winter by furnishing milk to creameries I would like to see the farmers helped in some practical way to make more and finer butter in their own places. Notwithstanding the importance of the creamery industry and the advantages that grow from its development I think one half of the butter will be made in home dairies for some time to come—in my lifetime anyway. From isolation of settlement, from various causes, about one-half of all the butter product in Canada will be made in private dairies. Now I think that the farmers' wives are eager to learn when they get a chance and I think the farmers' wives are able to make the very finest butter when they get a fair chance, but I think the trouble has been that the men have had all the good things. They had to have the horses and the reaping and mowing machines and the driving sheds and everything else they wanted while their wives had to get along with one pantry for keeping the milk, the butter, the cold vegetables, the pies and everything else. There the cream took in the mixed flavor. Now if the farmer would give the wife a small milk house I will warrant that it would be kept far more tidy than his driving shed, and she would take such a pride in it that it would make a man look after his own business. Then go around and see this woman struggling with an old-fashioned churn, working twice as long in churning the butter as there is any need for, and until it is not so nice as it would be if churned more rapidly, all because this man had to buy a new top-buggy and to build a new driving shed, etc., never thinking that his wife should have her strength spared and the needs of her department provided for. Get rid of these old-fashioned churns and milk houses and you will revolutionise the butter trade at once. I am not in favor of strikes, but if I could reach the ears of the good women that are such an ornament and joy to the households of Canada I would have them strike and say, "We won't do anything until you give us new milk-houses and churns." Men would likely stand out for a while, but they would have to give in. (Laughter.) I would like to see a scheme inaugurated throughout all the provinces and clear across our whole continent whereby one man or two men in each province with a capital equipment of dairy apparatus loaded on a travelling waggon would go right to every township and spend one day at one end of it and another day at the other end of it (letting the people know beforehand that they were coming) and show the nicest butter prints and other dairy appliances and practically illustrate and demonstrate the best way of making butter. How much would that cost, do you suppose? Each man would cost say $800, and for two $1,600. In this province there are about 200,000 farmers somewhat interested in dairying. How much would that cost? Less than one cent apiece. I think this would induce the farmer to get his wife a new milk house and a new churn. I find if one woman gets a nice, attractive, cheap dress twenty more women want to get the same thing, and if one woman gets a nice, new milk-house and churn twenty more women give their husbands no peace, night nor day, until they get that new milk-house and churn also. This would bring very much good to the dairy business. Now a very few facts about the making of butter after it has got that far. The cow elaborates the milk in the udder. You have blood coming in by the arteries at the top of the udder, which is composed of two glands lying lengthwise. Peculiar cells line the inside of the lactiverous ducts down which the milk trickles to the milk cisterns at the tops of the teats. In each cell a formation grows that is almost like a tiny bud. That bud by and by drops off and trickles down with the liquid milk. These buds are the globules of fat from which all butter is made. They float in the milk. Milk is practically all soluble except these globules and these are held in suspension in the liquid of the milk. They come to the top when the cream rises because they are lighter than the serum, but if a person after milking leaves the milk in the stable until the temperature goes down to sixty degrees these globules do not get through quite so quickly. Changes occur which make it almost impossible for these fat globules to gather to the top, either so completely or so quickly as if the milk were set in cold water immediately. To give an illustration. A man gets into the habit of doing nothing for an hour after breakfast every day. He will by and by want to take an hour and a half and by and by will become an unskilful, lazy man all day. Get into the habit of setting down the milk pails for half an hour after milking and these globules follow his example, since the man whom they are trying to serve is not trying to hurry. So in that way you will just find that inanimate nature always responds to man's activity or to man's slowness. The centrifugal machine is meant for the same purpose of separating the cream. It swirls around very fast and the heaviest parts of the milk are thrown to the outside and the lightest parts to the inside. Meanwhile if a man cannot use that—and for some time it will not be in common use—every man through the winter time can get plenty of cold water, as ice is very easy of access. Cold water can be gotten very easily, and if you put the milk pail into cold water you will get off the cream very quickly.

What about this bad stable flavor that never comes in milk from a cow that is fed on wholesome food? If you feed a cow in the winter time on turnips you will have a turnipy flavor. Every man should have a well ventilated stable, but not two well ventilated, not so well ventilated that in January those winter zephyrs will find their way across the cow's back ; but a fairly well ventilated stable that keeps the cow healthy. When the cow gives the milk it is warm—between ninety-seven and ninety-eight degrees. At that temperature milk will evaporate and nothing can settle on it so long as it is steaming, but if you leave it until cold it will absorb the stable flavor. If you attend to this matter of quick setting you get two gains, more cream and butter and a better quality of both. A man never does the right thing without getting two or three consecutive rewards for it. Unmeasured are the advantages of doing what is right. Then a very few words about the effect of churning. In making butter at home one can all through the winter churn once a week only if need be, and have the butter of exquisite flavor. Thus, you see, there is a great deal of labor saved by churning one day a week instead of three. That can be done in this way: if the cream is quickly cooled until it stands at forty degrees and is left cold until one day before churning, and then warmed up gradually to seventy degrees, and has added to it a small portion of sour cream or sour skim milk, the cream will churn easily and save all this trouble of churning and washing of utensils three times a week. Keep the cream at a temperature of forty degrees, raise it to seventy degrees one day before churning, and add about two per cent. of sour cream or sour skim milk. No man can afford to churn without a thermometer. He might as well shut his eyes and try to guess the color of the necktie of the next man. This plan of trying to tell the temperature with the fingers is no use. If you will do these things we will find that dairying in our country will begin to take the place it should have in our agriculture. It will be the one thing to which all the rest of the farm work will mainly tend, and the selling of concentrated products will pay far better than hay and coarse grains. A man can concentrate more skill and labor in a ton of better which at twenty-five cents a pound, is worth $500 than he can load into an equal weight of hay. Besides he need not load into $500 worth of butter one-tenth as much of real hard manual labor as into the hay required to fetch as much money. It will leave more time to think, and thought always sells dear in products. So instead of going on blindly grinding out blind results by merely following the men that have gone before us, we will find Canada certainly the best place to make milk and butter—summer for cheese mainly, winter for butter mainly. The raising of stock in winter and the fattening of swine in summer can be combined, and then along with these sheep and horses can be reared. The more of these products and animals, and the less hay, grain, and straw we sell, the richer we will keep our farms and the farmers will become wealthier than before. Along that line I believe winter dairying will come, and when it does come we will wonder why we have been foolish so long. (Applause).

Mr. MOYER—The farmers around this part of the country all raise turnips, and seem to think they connot get along unless they feed them, Now, when we go into winter dairying I think this should be stopped. There is one other point which I think is of very great importance, which has not been touched upon at all yet, and it is a very simple one ; that is the salting of butter. I find many people use common barrel salt, and very often you will find lumps of it in the butter. That depreciates the value of the butter at least two or three cents a pound, and fine salt can be got costing very little more a barrel. People should use nothing but the very best of salt for butter-making. The ordinary barrel salt is not fit to be put in butter, and by saving a fraction of a cent on salt they loose from two cents to four cents on their butter. I believe that three fourths of the butter that comes to Toronto is still salted with this common salt. Now I want a little light about ripening cream in the winter time. I think that at about forty degrees it will keep in perfect condition for a week, but after it stands three or four days there is a change. There is not the same change as in the summer time when the heat makes it sour. I learn from experts every day that if we let that cream stand for three days and then use it on the table it has not that nice sweet flavor when fresh, and if that is the case it must certainly injure the quality of the butter. Now, I do not know whether the idea of putting in sour cream before churning will work, because this sour cream must have been injured by some chemical change which I cannot explain to you, but I know it takes place. I have suggested to several of our makers the idea of ripening quickly by heating the cream right straight to a temperature of over sixty degrees. It will then get acid in a very short time and perhaps the butter will have a better flavor. But I would like to know what chemical change goes on in the cream, when it is kept so cold, after standing for two or three days.

Prof. **Robertson**—As to feeding turnips, the volatile oil in them seems to find its way into the milk and give the same taste in the butter, and it cannot be smothered or gotten out only in a very limited measure. So the safest way is to never feed milking cows on turnips. In the matter of salting, any salt that is pure, that will salt to the taste but which you cannot discover in the touch is all right. You want to have the butter taste of the salt, but never to feel it, because it should be all dissolved, as it will be if you use a pure velvety salt. In the matter of cream, after standing a while it will taste old because of certain changes from certain fermentations that go on at low temperature. They make old cream lose its freshness, but the butter from that is the fat mainly, and the fat seems to be unchanged. I find you can have as fine butter from cream which has been kept a week in the winter time as from fresh cream. Now a word about fermentation starting. It seems that there is in cream a certain amount of what is called the sugar of milk. Now there falls into cream from the atmosphere some of those spores that you see in a barn when a beam of light is striking through a crack. These things are falling into the cream all the while, and many of these start fermentation just the same as when yeast is put into bread. Now the sugar becomes changed by the activity of these germs. But that kind of fermentation does not work very well except between sixty and ninety-eight degrees, and then if above that temperature does not work so well. If your cream is kept at one hundred and fifty degrees it will not go on at all, so that if you kill these germs and protect it from receiving more of them you can keep the cream as long as you like. It will keep for a year if sealed, so far as sourness is concerned. Other fermentations would cause it to spoil and decay in other directions. Now, if you have it exposed in milk pans, there will be going on in the milk when at sixty or seventy degrees, lactic fermentation. Then it gets sour fast enough. If you keep it at forty degrees it does not go on at all, and if you increase the temperature up to sixty it goes on slowly. Therefore, in the winter time I put in a small quantity of sour cream because the quicker you can sour the cream fit for churning after the souring starts the better.

Mr. **Hunter**—Is it not possible that the butter extractor may revolutionise the whole and do away with the exploded theories as to the handling of cream carefully so as not to burst the globules of fat. We have had a machine placed in our factory. Scientists are opposed to that upon the ground that the butter globules are injured, and advocate a revolving churn of some sort without any dash whatever. Now, how are we to get into the right position amidst all this. I am using a centrifugal machine in my own work and my experience is that there is no necessity for waiting for the cream to ripen. I would like to ask what is this ripening? Is it not the first stage of decomposition. We have run the fresh milk through the machine and churned it and have got a first class quality of butter. Some of this put by in August in tubs we are using in our families. It was put up in butter tubs, not quite salted sufficiently for tub butter, and though it is not quite like fresh butter made yesterday, it is what would reasonably be considered good butter. Now, why this waiting for allowing any taint or anything else to affect the good flavor of the cream. I am satisfied that we will gain by any shortening of the distance from the milk pail to the consumers.

Mr. **Wenger**—Have you not found that you did not get as much butter from the sweet cream as from the sour?

Mr. **Hunter**—Yes; I would say that. We have by churning the cream at a reduced temperature.

Prof. **Robertson**—My experience is this, that when the cream is sour I get rather more butter from churning sour cream than from churning the same cream sweet. One illustration: At the creamery at Guelph we put parts of one lot of cream into five bottles and churned these at different degrees of acidity. We had the buttermilk analyzed in all cases and I found that there was recovered by churning sweet cream only seventy-seven per cent. of the butter fat. In another I got ninety-seven pounds out of a possible hundred when churned far too sour to make the butter nice. You can strike the mean and get the most and the nicest butter from cream slightly sour. There was some difference of opinion as to the method of churning with regard to the bursting of these globules of fat. So far as I know, they merely float in the milk and all we require to do is to get the cream in such a condition that they will come through and strike and stick. The acid seems to facilitate this object. Then, another point is this ; it has been said that these globules of fat are injured by slow or fast or some other kind of churning. They are so small that I have never known any kind of mechanical movement to injure them. Fifteen hundred of them would lie together like a row of marbles and measure less than one inch. But the least change of temperature will change them very much ; so that the grain of butter is nearly always spoiled by the temperature and not on account of the movement. Then, while the souring of milk is in a certain sense decomposition, it is not what you would call putrefactive decomposition, and the lactic acid which is formed is itself a germicide which will destroy certain other spores. For instance, if a man makes a cheese sour it will keep for two years without decaying and will keep so long and be so hard that he is allowed to keep it all the time. (Laughter).

Mr. **Thompson**—What is the effect of light on color ?

Prof. **Robertson**—Light will always make it brighter. At the same time more lactic acid germs get into the cream. Rather than brighten the color by the action of light I would put in a little coloring and make it yellow or brown as my customers preferred. (Laughter).

Mr. S. C. **Clark**—Would it do to use buttermilk instead of sour milk or sour cream ?

Prof. **Robertson**—In buttermilk you have something you have had through the churn before, then if you put it through the churn and have it in the buttermilk again you will find other fermentations which are apt to produce a peculiar smell which buttermilk acquires after standing for a long time.

Mr. **Thomas Brown**—You refer to the temperature being lowered by the milk standing for some time. Would raising the temperature of the milk to its normal state cause the cream to rise equally well. In regard to that there is another thing that is recommended, that we add from one-third to one-quarter of water, and there seems to be a contradiction about this.

PACKAGES FOR THE HOME TRADE, AND TESTING CREAM.

Mr. **Aaron Wenger** was next introduced. He said : There are a number of packages in the market. First of all you know the old-fashion firkin used in this market, with both ends loose. Then there was the old-fashioned hand-made tub. Subsequent to that there was the spruce tub, made by machinery in Quebec, and subsequent to that again we had the tin-lined tub. Now, these are all good packages for the export trade. For the export tub, however, I prefer the tin-lined and the firkin. There is no soakage, and, with a good salt paste on the top, it will keep the air from the butter. Then some makers prefer the spruce tubs to suit some of the English buyers. They have been in the habit of receiving the butter in this shape, and the English market is very conservative, but I find the tin-lined tub keeps the butter better than the spruce tub. Now, as to the home tub, some of these are good. Some people want a small package of butter to last two or three or four weeks, and many of the dealers want those tubs. Outside of that we have a little package brought before the public by Mr. White, of Belleville. These are made of white wood and tin, being lined with paraffine inside which renders them perfectly odorless and tasteless. These are good packages for the home trade. Then we have the pound prints. But the trouble that I have found in my trade is in making these prints. It is a very nice way of putting up butter, but the additional expense of keeping men to make these prints and of sending butter in that shape to the market means a good deal of expense and loss of shipping cans.

My experience last season was that if I had packed my butter and held it for later sales I might have made more profit. My creamery is run on the cream-gathering system. In place of paying for the cream as it comes to the factory I was led to the discovery that there was a great difference in cream, for this reason that no two farmers' cream would rise under the same conditions. I believe under the same conditions you will get precisely the same cream, but habits vary very much and the cream varies with them. For instance, a farmer had five or six or eight inches of cream and we churned by a test and paid for the next two weeks on that basis. If found short I deducted, and if there was a surplus I added a little to make the thing uniform. I found that the shortage was too great to make anything out of it. Then I got a cherry tester, but this I found impracticable in many cases. Then next we heard of the oil test. The oil tests consist of small tubes about nine or ten inches long. You put in about five inches of cream. The tubes are all numbered as well as the samples of cream, and by this means the manufacturer is protected and the patron is likewise protected. There can be no possible mistake by which the patron will not receive exactly what his cream is worth. The samples of cream are brought in during the day to be sour next morning and rocked in this little churn until they are churned. They are then taken out and put into a water bath, hot enough to melt the butter in these tubes, when the oil will rise to the top, and the depth of that oil is measured and from that we arrive at the conclusion as to how much the cream would yield per inch. If there is a surplus of butter in the cream you should arrive at a conclusion as to what it is worth and add that percentage, and if there is a shortage deduct the percentage. But to get the proper value, these tests should be made every day, because one day a farmer may have twenty inches of cream testing eighty and the next day he may have only ten inches testing one hundred. For every twenty inches of cream he would have twenty-six pounds of butter, taken on an average, and on the first test he might only be paid for two pounds of butter. The patron should be paid exactly for what his cream yields, because we find the cream supplied by very few farmers to the creameries is exactly alike; but I find where proper care is taken the cream will vary very little from day to day. One of the largest patrons I have sets his milk in a spring, flowing right out of the rock, so far down that it is not influenced by the hot weather of summer. The temperature of his cream is kept the same year in and year out. It has stood regularly at one hundred on a test as to the value of the butter fats from the opening of May till September, showing that under proper conditions the cream will always test the same; but I find that under varying conditions it will vary from time to time.

Then, in regard to testing in the centrifugal creameries, Mr. Sprague, our creamery instructor is a buttermaker and can give some information. A great many patrons have the idea that if they send sour cream they will get a higher test, a higher percentage and a higher yield. It is wrong where the cream is taken out of the water and soured. Those who do it are injuring not only themselves but the creamery. There is a certain amount of whey in the lower cream and the upper cream is richer, and when patrons send it to the factory in this shape it is so sour that the buttermaker cannot get the article he should get. We want the ripening and handling of cream done entirely by the buttermakers.

CREAMERY INSTRUCTOR'S REPORT.

Mr. **Mark Sprague** was next called upon to present his annual report which is as follows:

Mr. President and Gentlemen: It is gratifying, I assure you, to present this Board with the Instructor's Annual Report. There were thirty-nine creameries under supervision the past season throughout Ontario. The daily average make of these thirty-nine creameries was 14,500 lb. of good A No. 1 butter. Of these 39 creameries, 11 are milk gathering and 26 are cream gathering. I secured 27 members. Tested 1,064 samples of milk, and I take this opportunity of congratulating the creamery proprietors on having such an honest and upright patronage, as there was only one conviction, out of 1,064 samples. It was necessary in a few cases to give warning, and the warning in each case was sufficient.

I will embrace this opportunity, Mr. President, to ask the assistance of this Association to be given the cream gathering creameries, by way of their patrons. There seems to be an idea prevalent that their cream must show a test of 15 or 16 ounces to the inch or there is something wrong, and in order to get this large test the cream is placed in a warm place, and in too many instances is injured if not made unfit for human consumption, especially in the hot days of August and July. Now, these patrons should, and must be educated before the desired high quality can be attained. It is true there are localities in which these troubles are greatly modified.

But if you look into this matter you will find an enterprising creamery proprietor. At the Ayton Creamery there was a marked improvement in the quality of the cream received. On enquiry, I found the proprietor was sending out among his patrons printed dodgers or circulars, on the care of their milk, as to straining, care of cream, etc. The creamery patron must be educated as well as the butter maker. Hoping this Association may never tire of its good work, and not wishing to occupy too much of your valuable time,

I am, yours obediently,

Mark Sprague,
Instructor.

Mr. Sprague explained that although there was only one conviction out of 1,064 patrons he did not mean to say that this was the only man who was found wrong. He further said : Now, I find creameries where there is a marked difference in the cream. In one case I found the proprietor had gone to the trouble of getting out dodgers and have the cream gatherer place one in the hands of each of the patrons, giving directions as to the care of milk and cream and this plan worked well, and in those creameries where this has been done I can show the evidence of the good work, especially in Mr. Wenger's Ayton creamery, and I saw when I was there the best of cream, calculated, in my estimation, to make the best butter in the cream gathering creameries. Mr. Wenger deserves great credit for the enterprise he has shown in this direction, and I say this to stimulate a desire in others to do as Mr. Wenger has done.

Mr. J. Wilford.—Mr. Sprague has given great praise to the Ayton butter and of course he may have tested it, but I imagine in Crosshill we made as good butter as was made in Ayton, and I think we demanded as good a price as any place in Canada and we got it.

AFTERNOON SESSION—QUESTION BOX.

On resuming at two o'clock, written questions, which had been put in the question box during recess, were disposed of as follows :

Question.—How did the dairy butter compare with creamery at the last Industrial Exhibition, Toronto ?

The President.—I was a judge at the Industrial Exhibition on butter and I never was so thoroughly struck with the importance of our creamery business as I was at Toronto examining this butter. The finest exhibit of creamery butter, I may state, that was ever made in the Dominion was made in Toronto last September—put up in the finest way. Really it was a great credit to the Creamery Association. You know the Association gave something towards inducing the Industrial Association to give a prize worthy of the Creamery Association and the dairy interest of the country and the exhibit was very nice indeed. The dairy butter, on the other hand, was fairly good butter, but there must have been at the least calculation six cents a pound difference in the value of the average creamery butter as compared with the average dairy butter. So I feel very proud, and hope we will be able to make the difference still wider between dairy and creamery butter. Of course the idea has been talked about considerably of educating our farmers to make better butter at home. If it is to be made on the farm I would like to make the best we can, but there is five per cent. of the very best farm houses lose money on account of unskilled people trying to manufacture butter without proper facilities and without proper accommodation to manage this particular business. Now, we know that the farmer will get a self-binder and all the other conveniences for himself, while he will have an unsuitable milk room and churn for his wife, who is without ample conveniences and often without skill. So we find out by these things and careful inspection that there is five per cent. or $1,500,000 a year lost through not having proper butter. If we put it at the modest difference of four cents a pound between them, it would make $2,700,000 lost this last year in consequence of not having all the butter we make made in the best way by the best men and with the best facilities.

Question.—(1) Will salting cows regularly improve the keeping qualities of butter? (2) Should the milk be aired before setting for cream? (3) Will salting improve the keeping quality of butter?

Prof. Robertson.—(1) Yes, increase the milk and improve the quality of the butter. (2) I would just air very slightly to prevent the milk from being cooled down. (3) Up to a certain point it will. About one ounce up to a pound is the proper proportion for packed or tub butter.

Question.—What is the best grain ration for improving the color and quality of butter.

Prof. Robertson.—A grain ration should be given with economy. In Ontario two-and-a-half pounds of pease, two-and-a-half pounds of barley and two pounds of bran with one pound of either oil cake or cotton seed meal per cow per day.

Question.—Will you please say which breed of cows are most profitable for butter making and also how much salt we should give per pound?

The President.—Governor Hoard was asked that question by a persistent inquirer and he answered, "My dear friend, you may as well ask me to tell every man in this room what kind of a wife he should keep."

Prof. Robertson—I may tell you that I would rather pick the man's cow than his wife anyway. But if a man wants a large yield of cream or butter he will get the most profitable returns from Jerseys or Guernseys, or their grades. If he has a light farm and wants to get good average milk he will get it from the Ayrshires; but if he wants butter for the winter, and to raise calves for beef as well as milk, he will do best by the Shorthorns of milking strains, and Holsteins.

Question—What is the reason that cream will rise on sweet milk after the cream is taken out of the cans?

Prof. Robertson—Well, when the milk is put into a can the largest of the fat globules rise quickest and come first to the top. If put into cold water as soon after the milk leaves the cow as possible, nearly all the cream will come up. About ten per cent. of it may be left in the milk. If that skimmed milk is set in a can small fat globules may come to the top for two, three, four or five days, but all the cream that comes up after the first skimming is made up of smaller globules. It does not make such good butter. The globules vary in size from the fifteen hundredth down to the seven thousandth part of an inch perhaps.

Question—Would you advise farmers to add water, and if so at what temperature, to milk in the fall and particularly to the milk of stripper cows, to overcome the viscosity of the milk, for the purpose of raising all the cream.

Prof. Robertson—These fat globules of which I spoke have some difficulty in passing through the serum. In the autumn and winter that is more gummy and sticky and will hinder their movement. Therefore, in the fall of the year I would add about 25 per cent. of water to the milk of strippers. I would raise the temperature of the milk to about ninety-eight degrees and it will make the cream rather easier of churning.

Question—Can turnips be fed to cows so as not to be discerned by tasting in the milk or butter? If so in what manner can they be fed?

Prof. Robertson.—Well, the feeding of turnips to cows will always affect the flavor of the fat in the milk. Some people may not discern the flavor but it is still there. But if people must feed turnips to cows the best way is to feed immediately after milking, so that by breathing they will eliminate this odor to a certain extent, and then if they will add a small portion of saltpetre to the milk when it is set it will lessen the effect of feeding turnips. It will still be discernible, but this will lessen it as far as possible.

Question—Do you say that your experience is that by churning sweet cream, say at a temperature of fifty-five degrees you get more butter out of it than by churning it at sixty degrees? I have found by taking cold, sweet cream and by heating it up rapidly and churning it only about two-thirds of the butter comes off. Can you explain why it is so?

Prof. Robertson—In the first place I did not say so, but two or three in the hall said so. But even if you heat up such cream rapidly to seventy degrees you will get just the large globules to stick where they strike and the small ones go with the buttermilk. An analysis would shew about one-fifth of these globules remaining in it. But on the whole if you will cause the cream to be a little sour before churning you will get more butter and that of a rather finer flavor.

Question—If I understood Mr. Wenger rightly this morning he said that he placed test in warm water to start the ripening process. Now, the half of those tests were ripe when he got them and by placing them in the way stated there would be a part of them over-ripe, and as I understood some of our speakers, the over-ripe gave the most butter. Now, what I want to know is how to come at the test in the best possible way to give each patron his right.

Mr. Wenger—As those who are familiar with the oil test understand, we use from twenty-five to forty tubes in the crate. Some of those put in first at six o'clock will be sour; some put in in the afternoon will still be sweet. It would be impossible to delay testing those that are sour for the sake of ripening those that are sweet. We put those that are sweet into water at probably sixty to sixty-five degrees, so that they will be sour the next morning. The difficulty is we are not getting the butter itself; we are simply getting the oil to measure, and we must have all these tests sour. Now it makes very little difference as long as they are sour and will churn. After being churned the tubes are put into water at 140 degrees temperature so that the butter will melt and rise to the top through the butter-milk. If properly done there will be two distinct parts. The upper part oil, the centre almost pure water, and the lower part casein or curdy matter. If we do not get that clean separation at the first which we desire we put the whole curd right back into the churn and do it over again, until we think it is time to treat it with the hot water bath, so that the second churning will give us a clean separation. The moment we have a clean separation all the oil will lie on the top.

Question—Are we likely to over-work or under-work our butter?

Prof. Robertson—In packing butter in tubs the danger is that people will over-work it, but in putting butter into prints, if the butter be kept cool enough, there is little danger of over-working it.

SKILL AS AN ESSENTIAL TO SUCCESS.

Hon. John Dryden, Minister of Agriculture, having been welcomed in fitting terms by the Mayor on behalf of the town, and the President on behalf of the Association, said: I am sure I am very grateful for the kind words that have been spoken by both the gentlemen who have given me this formal welcome in your midst. I am very glad, indeed, to mingle with the citizens of this town and vicinity and to be present at this convention, because I am not merely mingling with the dairymen in this neighborhood, but I find men who are old friends from different sections of the country. We have them from the east and from the west, all interested in the work of the Association. I ealise that the name which you bear indicates to my mind that you are desirous to improve. Association means associated effort; it means co-operation; and I cannot impress this thought too strongly upon the minds of our farmers everywhere. It is too true that they are compelled to lead isolated lives, and if there is any class that needs to be associated in co-operation it is the farmers of this country, and yet they too often stand aloof when called upon to "stand and deliver" by other organisations which are formed for the purpose of endeavoring to foster one industry and another. Now, we are all working for the good of the common people. We are producing the same products and sending them to the same markets, and when we think of this we must all feel in this regard that by association we are helping one another. By associated efforts you will be able to economise the cost of production of the different products you are bringing to the market.

But I believe, notwithstanding all you may do by the help of this Association in the way of establishing creameries in this country, it will be true for a long time to come that a large proportion of the butter will after all be produced in private dairies. Now, what I feel is that we need to devise some scheme by which we can reach these people, because their products go on the market and mingle with yours and affect the sale of yours to a certain extent. I have been thinking this over, and I want you to assist me in devising some plan which will raise the quality of the average butter in this country. I think I have a right to ask you to help me, and I promise you I will have no difficulty in inducing the Government to assist in this matter when a proper plan can be proposed.

Now, if you are to produce a better article you are to use better skill. Professor Robertson has talked to you about the necessity for the employment of skill in the production of articles which we agriculturists are placing upon the market. Now, I submit that skill is based upon knowledge. Suppose some of you in the summer time should fancy to take a trip down the St. Lawrence and you took your place upon the deck of the vessel; I apprehend you would not go very far without feeling some alarm. Why? Because you see an obstacle ahead which the ship is bound to strike and wreck the vessel and cause the loss of a great many lives; and the cold chills run down your back; you forget just for a moment that there is a man at the helm who has a perfect knowledge of all the obstacles, so that when the proper time comes, by means of the wheel, he is able to guide the vessel so that she turns past the obstacle safely and bye-and-bye draws up to the wharf. It was the skill of the man that saved the vessel from disaster, but that skill was based upon knowledge, and he could not have done it if his skill had not been based upon knowledge. And so your skill must be based upon knowledge as well. You must know what you are seeking to do—you must know what you have to do—in order to bring about the very best results, and therefore it comes to pass that although associations like this cannot directly, they can indirectly, help you in this matter. Knowledge itself is not skill. There is a decided difference. We may give testimony of the knowledge we possess, but if the parties interested do not lay hold of that knowledge they will never be able to use it in this skill of which we speak. We as agriculturists need more study, more thought; we need, so to speak, more originality. I like to see a neighbor copying his neighbor, but I do not like to see our agriculturists mere copyists; and some of these gentlemen here have got that originality and are studying these questions out for themselves. We have got to do this throughout the province, and if we are to keep up with the rest of creation we have to move forward in this regard. It is not enough that we should merely exercise our muscles, but we must exercise these muscles more intelligently than we have ever done in the past. Now, Governor Hoard was down at Brockville attending the Eastern Dairymen's convention the other day, and I had a little conversation with him privately, and he was telling me what might be done by the use of skill. He said: "I apprehend you will have to be skilful in breeding, in feeding and in milking. You will have to use skill in all these three matters." He told me of a neighbor who was a patron of his creamery; this man was able to receive something like $38 per cow and he was not satisfied with it and came to Governor Hoard and said: "What am I to do; is there any way I can improve this matter?" "Yes," Mr. Hoard said, "you may improve your herd of cows. Instead of having the herd of cows you have, you ought to add fifty per cent. to its earning power. Since then the man has gone forward, by using skill and breeding, until last year his herd of cows netted him $63 instead of $38 per head. Now, many of us are ready to say "Oh, I cannot do that." I don't like to hear a young man say that. I never say it. I say if any man can do it I can do it, and if they can do these things you and I can do them; but we don't want to stick at what they have done; we want to go ahead of what they have done. There is no use looking to governments to pass legislation to help us out of the ditch. One of the great cattle firms of Chicago, Armour & Company, are able, by working the grease taken from animals, which might be sold for five cents a pound, through their meats, to obtain eleven cents a pound for it. This is done by the use of skill. It is so with reference to all the products which we grow upon the farm, and what I have to say to you to-day is what I said to the convention at Brockville, that we need to put upon the market a better quality of butter. How much of the imported butter is consumed by the people of Great Britian? They import 20,000,000 hundredweights, but only 22,775 hundredweight of that is sent from Canada. We allow the people in Denmark to get ahead of us in this respect. We must not allow this; we must educate our people, and ask them to come forward with more skill and take a share of the market which is here open to us. I just happened to pick up a report the other day which was sent in to our Bureau of Industries, which came from Robert Reesor, of the township of Markham, giving some interesting statistics. Last year he had thirty Jersey cows. He sold the cream, which he was able to obtain from this herd of cows, in Toronto. He has shown skill, mind you, in the breeding of his herd, although I presume he has also shewn skill in the feeding, and he has shewn some skill in disposing of the product, selling it to large establishments in Toronto like the Rossin house, the Queen's hotel, and McConkey's restaurant. He has produced 3,558 gallons of cream for the year, which he has been able to sell at one dollar per gallon. I have figured this out as being a little over $118 per cow. I don't vouch for the accuracy of this, but give it simply as an example of the skill which has been referred to.

I quite recognise that I am to be followed by some other gentlemen who will talk to you on more practical topics. But I just want to say this to you that we the agriculturists of this country, should seek to help ourselves. One author says, "If you would reform our country you must learn first of all the way." I don't think we have reason to be ashamed of the results in the days gone by; but I am not satisfied, I want to go ahead of what has been done in the past. I want that "Excelsior" should be the motto. You have my entire sympathy, and any reasonable assistance which I can give in the direction of raising the average products of butter you may always count upon. (Applause.)

MILK TESTS.

H. H. Dean, professor of dairying at the Ontario Agricultural College, was next introduced and said: I do not know why I am asked to come here, but I presume it is because I am expected to say something in regard to dairying at the Agricultural College. I have not prepared anything especially to say here, so you will bear with me if my remarks are not as connected as they might be. Then I have been away at institute work, speaking two and three times a day.

Allow me, Mr. President, first to congratulate you upon your election as president. It has ben said, if you want anything to succeed get a big man at the head of it, and I am sure this convention has succeeded in doing this. But not only are you big in stature but also big in brain and in heart, ready to sympathise and help. We are here, gentlemen, in the midst of the land of sauerkraut, limberger cheese and bologna sausages, and I think that if you would keep the President here for a few days he would grow even larger than he is at the present time.

I am somewhat like an Irishman named Paddy O'Brien, who had a Dutch mother. Someone asked if he was an Irishman, and he replied, "Yes I am, be gobs, by Dutch consint." So I am a Canadian by Dutch consent and hence have a warm feeling for my German cousins who have entertained us so well.

I am requested to say a few words this afternoon about milk tests. You know it is the fashion at the present time to invent new tests for the determination of the fat of milk. The chief ones now on the market are Patrick's, Cochrane's, Short's, the Beimling and Babcock. Those are favored on account of the shortness of time they require, but some of these take too long. A test to be serviceable must be accurate. If it comes within two tents of one per cent. it is accurate enough for practical work. Then it must be rapid. Creamery men have not the time to devote a day or two to the testing of milk. Then again it must be cheap; farmers and makers cannot afford to pay a large amount to get the milk tested. And it must also be simple. There are therefore four things necessary in a milk test—accuracy, rapidity, simplicity and cheapness. Now the two chief tests before the public at present are what are known as the Beimling, which is being put out by the Vermont experimental station and the Babcock by the Wisconsin. In the Beimling you use no hot water, but two chemicals instead of one as in the Babcock. The first chemical is made by mixing amyl alcohol and concentrated hydro-chloric acid. The second one is commercial sulphuric acid. By this method you can test a number of samples at the same time. The Babcock uses commercial sulphuric acid and hot water. I have had some experience with the Babcock tester this last season, and I may say that it is accurate enough for all practical purposes. Now about its rapidity. After the milk has been measured. sixty tests may be made in less than two hours. You can get a small machine, but I would advise not to get a machine with an odd number of bottles, one which has fifteen is unhandy as you require to test in duplicate so that you need an even number. Supposing you were going to test eight or ten or fourteen samples it destroys the equilibrium of the machine and it is necessary to fill it up every time. The principle upon which this machine works is as follows: You measure the milk into the bottles, add a certain quantity of sulphuric acid, set them in the machine and by means of a crank it is whirled around at a great speed, add hot water after turning five or six minutes and the fat rises to the top where the per cent. of fat may be read on the graduated neck. Milk is composed of water 87.00 per cent., fat 3.75 per cent., casein 3.90 per cent, albumen 0.75 per cent., sugar 4 per cent., ash 0.70 per cent. Now this sulphuric acid dissolves the casein and albumen and liberates the fat, and the fat rises to the top and in six or seven minutes you can tell the percentage of fat in a sample of milk, so that you have a very rapid means of reaching a conclusion. I think it would be better if milk were bought and sold on the basis of the fat value. The cheese-factory inspector, Mr. Harris I think it was, found one man's milk last summer which contained two and a half per cent. of fat, while the milk of another contained five per cent. of fat. The man whose milk contained five per cent. of fat got no more for it than the other, but was it not worth more per pound than the other? Well, supposing the one containing two and a half per cent. and the one containing five per cent. were mixed together it would bring the average of the fat up to three and three quarters per cent., and from this you can get a cheese of good, creamy quality, so that before long I think we shall use some test like this to determine the fat of milk sent to cheese factories and pay accordingly. In a word I have given you an outline of the machines. Commercial sulphuric acid will cost about two cents a pound in large quantities and one test will cost about one fifth of a cent.

Butter-making.—I have been asked to say a word in regard to butter-making. All the buttermaker wants is the fat out of the milk. How shall he get the fat out of the milk and into the butter? Butter is composed of fat 86 per cent., salt 3 per cent., water 11 per cent. How shall we produce this article and get it in the best shape possible? Just a word in regard to breeding and feeding stock. For the average farmer it will be better for him to select his best native cows—those he knows give a large quantity containing a good per cent. of solids—breed them to a pure bred bull of one of the milking breeds—not one of the beefing breeds—raise the heifer calves on food that is not fat-producing, breed them again to their sire and have them drop their calves at from two and a half to three years old ; milk them for eight or ten months, and after having dropped their second calf all those that do not come up to a certain standard of excellence, say 6,000 pounds of milk in a year containing at least 750 lb. of solids, weed out, as is the practice in the dairy herd at the Cornell Experiment Station. In this way a profitable herd may be built up at much less expense than by buying pure bred cows and paying fancy prices for them, as in many eases when a farmer invests in fancy stock he loses money. It is far cheaper to improve through the male as he is half the herd.

By means of care, research and patient enquiry the Germans found that if a certain ratio of elements were fed the best results would be obtained in milk production. They say if you have a cow weighing 1,00C lb. she requires, dry matter 24.0 lb., albuminoids 2.5 lb., carbo-hydrates 12.5 lb., fat 0.4 lb. Such a ration will have a nutritive ratio of 1.54. By nutritive ratio we mean the ratio or proportion of nitrogenous or muscle-forming substances to the carbonaceous or heat and fat-producing substances. Now, I do not think that a farmer is wise to follow too closely along that line but simply use it as a guide. Some farmers say of theory that it does not amount to anything. But is there not something in it ? To illustrate, I have here a couple of rations fed by New York dairymen. One was feeding the following daily to each of his cows. Hay 12 lb., corn stalks 13 lb., straw 8 lb. Nutritive ratio 1.156, or he had nearly three times as much heat and fat-producing foods as required by the German standard. Such a ration would cost about ten cents a day, and for a year $36.50. He had a herd of eight cows. How much butter do you suppose he was getting from his cows ? He was getting 156 lb. a year from each, which if sold at 25 cts. a pound would bring him $39, and he would make on each cow $2.50, and on his herd of eight cows $20, that is supposing the manure and skim-milk paid for the taking care of the cows and the milk.

Here was another man in the same state that was feeding each of his herd, hay 20 ℔., ensilage 50 ℔., corn meal 3 ℔., bran 7 ℔., cotton seed meal 3 ℔., nutritive ratio 1.67 which comes nearly to the German standard. This man was getting 470 ℔. of butter from each of his herd while the other man was only getting 156 ℔. 470 ℔. at 30 cents a pound would bring him $141 for each cow for a year. I have supposed that he received 30 cents a pound for his butter because a man who puts skill in breeding and feeding will also likely put skill in his marketing, for scientific making is the hand-maid of scientific marketing. Well such a ration as that would cost for each cow about 30 cents a day and for one year $109.50, and he would make on each cow $31.50, or from the whole herd of 30 cows $945. So after all it appears that there is something in science and I think that when we have such examples as that, we can no longer say there is nothing in science as applied to the dairy. I have just selected these because they are extreme examples. Well, if you have got a good cow how shall the milk be profitably turned into butter ? What I have to say is more particularly for farmers. Prof. Robertson this morning dwelt on the necessity of properly setting the milk, and I would emphasise keeping it as clear as possible because milk is extremely susceptible to impure odors. Therefore see that there is no impure odor while milking. During the process of milking you promote the secretion of milk because it has been found on killing cows that there were only one or two quarts of milk in a full udder and from that scientists have concluded that during the process of milking the milk is secreted and milking induces the secretion of milk. In regard to the best way of setting milk have a special room for it and do not set in a closet or cupboard in the living room where impurities will reach it. You cannot make a first-class quality of butter if you set it in such a place. I am glad to emphasise what Prof. Robertson said about having a special place. I agree with him that it is not wise to set milk in a damp cellar. If you can get a dry cellar I think it could be used for milk and where there are furnaces in the cellars it will require no extra heat ; but where you cannot have that, have separate milk houses. In regard to shallow pans, if you have the milk in them under the very best conditions you will get as good results as from the deep setting, but there is a greater amount of labor and it is more difficult to control the conditions. In the case of any person who has a proper place, it is a good idea to set the cans outdoors where there are no foul odors and no danger of the cans being knocked over, but do not set them in a living room because you will not get all the cream. If you are to get the best results you must have a falling temperature because the cream is of a less specific gravity or lighter than the other constituents and rises best with the temperature falling. In regard to the time to leave the milk set, you will get all the cream to rise that is worth getting by the deep setting system in twelve or twenty-four hours and in the shallow pan in 36 hours, Mix the cream from all the skimmings at least twelve hours before churning, because in this way you get the cream all to the same degree of ripeness. I carried on some experiments this winter in which an Ayrshire cow's cream was churned while sweet, and the butter-milk contained 5.4 per cent. fat in it. Ordinarily it only contained one per cent. A Holstein cow's cream churned sweet, the buttermilk had 4.5 per cent., ordinarily it contained 0.25 per cent. of fat. And a Jersey cow's cream which was also churned sweet contained 0.2 per cent. of fat while ordinarily it contained 0.30 per cent. of fat. This one experiment indicated that a Jersey cow's cream gave best results when churned sweet, while the others were not nearly so good, but it needs to be verified. Do not add hot water to the cream. I have seen women do that. It will spoil the grain and color of the butter. A better plan is to set the cream, crock or pail in a vessel of water heated to not over one hundred degrees. If you warm quickly it will spoil the cream. Between fifty-eight and sixty-four degrees will give the best results. When I was a boy I had to churn until the dasher would stand on top of the butter. Well, now that is a very poor plan because by that means you get too much curdy matter in the butter in which there are elements that tend to make the butter taint. Stop the churn when the butter is in the granular state. Take a little salt water after draining off the buttermilk and wash the butter which will wash out most of the casein or curdy matter. In salting butter between half an ounce and an ounce of salt to the pound will give you good results. There has been quite a controversy during the last season with regard to the yield of butter from the different breeds, some giving the results as salted and others as unsalted butter, the former way is the better. It has been said that butter will not weigh as much after being salted as before. I tried some experiments lately, and as an average of fourteen experiments, the average weight of which was fourteen pounds six and a half ounces, the loss was two pounds eleven ounces. The greatest loss was five pounds five and a half ounces in sixteen pounds five and a half ounces, and the least loss was thirteen and a half ounces in eleven pounds. In every case the butter was drained as dry as possible in the churn, weighed and salted at the rate of one ounce to the pound, and then worked ready for market. Thus you see butter loses in weight after salting, as salt absorbs the moisture. I think it is better to work it by pressure than by friction, and by all means do not work the butter with your hands, because all the time there is coming from our bodies effete or foul matter through the skin and lungs. Suppose you have washed your hands ever so clean you cannot stop this coming off and going into the butter. In olden times people used to try and get a dairy maid with cold hands, possibly for the reason that a "cold hand indicates a warm heart," but more likely because they thought such a person would not be so likely to taint the milk or butter by handling. It will not be necessary to work it more than once if sold near home, and there is just as much butter spoiled by overworking as by underworking. In marketing put it up in a neat and attractive form. I think these packages which we see here to-day are a great advance on the old plan of putting butter on the market. I have heard of an instance where a man put his butter in a piece of an old shirt on which some of the buttons were still to be seen. A man who puts it up in that style cannot expect to get the best price. If you produce a first-class article there is always room at the top, but so long as persons make good, bad and indifferent butter, we cannot expect good prices. We have made a reputation in cheesemaking by co-operation, and if we are going to get a good reputation for our butter it must be done through co-operation. I do not see anything to prevent farmers co operating and getting their cream made up on a general plan where they are assured of a uniform article and uniform price. The greatest drawback at the present time is not because there is not good butter made at home, but because some of it is good and some of it is bad. What the export trade requires is a uniform article, and to get this it will be necessary to make it on the co-operative plan. I am glad the Association is educating our farmers because we cannot know too much, and the more knowledge we can have regarding the art of buttermaking or of anything at which we are engaged, the more likely we are to succeed.

AN EXPLANATION.

Mr. Wenger.—I wish to say a few words to place the inspector right before you. Just before dinner there was a reply which I thought reflected both on Mr. Sprague and myself. Mr. Sprague called at my place several times last summer. I have spent in the last six or seven years thirty or forty dollars a year in putting my views before my patrons. I have attended every convention we have had; I have swallowed everything that has been said; I have read Hoard's Dairyman; I have the reports of these conventions, and from all these things I have formed certain conclusions. I put these down concisely in English and German and distributed them among my patrons. I called Mr. Sprague's attention to this and told him that the patrons had brought uniform cream during the season. This of course was in Mr. Sprague's mind, and that is the way my name was brought up. In regard to the gentleman who said he got a better price than me, that is a matter between him and his buyer.

Mr. Sprague.—I can assure you that I was put under peculiar circumstances through reading the report. I wish now to make an explanation, not to retract anything I have said, but to try to make you understand the report in the way I put it. I said this, that the quality of cream that I saw this summer at Mr. Wenger's creamery enabled him to make the very best quality of butter.

THE CATTLE EXPORT TRADE.

Moved by D. Derbyshire, seconded by A. Wenger, and resolved

> That whereas the trade in the export of live cattle from the Dominion of Canada has been gradually extending during the past few years and has been a source of profitable income to our farmers and carrying companies, we, the Creamery Association of Ontario, hereby record our judgment that the robust health of the cattle of Canada, their freedom from all dangerous diseases and their general excellence of quality is proverbial, and that the people of England need not fear that the health of their stock will be injured by the arrival of our cattle on their shores. We regret very much that the weather has of late been so inclement on the sea that some of our cattle have perished. That does not establish the presence of any disease in Canada, and we hope that Mr. Plimsoll will remain in Canada long enough to be convinced of this fact. It will be a very serious matter if the landing of live stock be stopped in England, as we cannot compete with the ranches in the west where they can raise cheap corn for the breeding of cattle.

A WINTER EXHIBITION OF BUTTER.

Prof. Robertson: Just a few words. I examined a print of butter brought here this forenoon. It was of excellent quality. That leads me to say that I think next year the Ontario Creameries' Association should have an exhibition of butter in connection with the annual convention, and then the good qualities could be pointed out and the defects made evident. Sometimes during the summer exhibitions the weather is warm and the outside of the butter is therefore soft while the inside is good in body and flavor. At this season there would be no difficulty of that kind. Part of the money of this Association now unexpended could be used in the way I suggest. Instead of giving so much in the way of prizes at the summer exhibitions we might save the money for the winter, and have prizes large enough to attract exhibitors from all parts of the province.

I listened with a good deal of pleasure to Professor Dean, of the Ontario Agricultural College. I have a great many children over this province in some senses, and as I followed his line of treating his subject this morning I became convinced that I had a worthy pupil who would bring credit to the institution which he represents. If every farmer will give him a fair chance to do good work amongst you I am sure that you will not be disappointed. With a little longer experience in public speaking he will be able to hold his own before any audience. My own first attempt at a public address was a pitiable exhibition of weakness compared with the capital presentation Mr. Dean made of his subject to-day.

DAIRY EDUCATION FOR THE FARMERS.

Mr. **Macfarlane** : I merely wish to express my gratification at the sentiments and assurances conveyed in the speeches of the Minister of Agriculture and Professor Dean and also to say that it occurred to me that perhaps in the whole of the discussions which have taken place during these two days the farmer had not had the best "show." He was somewhat in the position of the congregation as against the clergyman; they are not allowed to jaw back. It is allowed too that since co-operation is supposed to be the best plan it is not very judicious to encourage the matter of private dairying. It seems to me if you encourage the farmer to do that thing you are bound at the same time to help him in this way. If for instance a certain individual undertakes to make a better quality of butter than his or her neighbors, and succeeds in so doing, and carries this product to the storekeeper and finds that there he or she can get no better price for it than for the most inferior quality that is offered to the said storekeeper, I think there is very little encouragement, indeed, for the farmer to proceed and do the best he can. It is not realisable in dollars and cents. His butter is made a good deal better and yet he obtains no better price for it. Now, I think something ought to be done to help the farmer in that way, and I do not see any other way that this can be done than by encouraging a co-operative system, and anything that may be done to help the farmers in this respect would be trying to establish in a good dairy district a model butter factory for the purpose of taking the manufacture entirely out of the hands of the farmers and doing it in the factory. Now, there is a difference in the values of cream, as Professor Dean has shown you. He spoke of milk being delivered to cheese factories, some of it considerably more valuable than others. In this case, too, the dairyman or farmer who delivers a five per cent. milk has no advantage in doing so. He is simply paid at the same rate as the man who has a two and a half per cent. milk, which is no encouragement to breed dairy stock. If he is to be encouraged at all it must be by giving those who produce a better quality of milk a better price. In order to do that the system of paying according to the fat in the milk must be introduced; and here it is that the Governments might do some good by establishing a creamery in some favorable district, worked upon that principle, getting the results and showing to other districts what could be done. I hope any assistance which the Governments may give will take that shape.

Mr. J. **Wilford**.—I do not know Mr. Macfarlane, but I cannot afford to let what he says pass without making a few remarks. In 1886 we established a creamery at Crosshill, and what brought the matter to my mind was that Mr. Macfarlane says the farmers and farmers' wives should be helped to work in their own system. Some ten or twelve of us took out stock in this creamery. We have placed in stock at the rate of $1,600, and from 1886 we have not received the first cent benefit for our money. The farmers in that section have received the value. We propose holding our annual meeting on the 24th of the present month, and there is no dividend for us still; but we don't care a straw if we don't get a cent benefit from the money advanced if we only get farmers to send cream to the creamery to be manufactured into butter. There is one merchant up there who takes dairy butter from the farmers who trade with him, and I understand from himself he has lost between five hundred or six hundred and a thousand dollars on that stuff. He does not get a cent benefit from it.

Mr. **Wenger**.—We do not blame the farmers; it is the merchants. If a woman comes in and brings forty pounds of butter and buys $500 worth of goods in a year and if I can secure her trade by giving her four or five dollars more for her butter than it is worth I am going to do it and the rest of the merchants do the same. At Ayton we give cash for the cream, and then it is the same as when wheat is taken to the mill—it is examined and bought for what it is worth. (Applause.)

INCREASED GOVERNMENTAL ASSISTANCE ASKED.

Moved by JOHN HANNAH, seconded by J. S. PEARCE, and resolved, that—

Whereas the ever-growing magnitude of our dairy business is creating new problems and difficulties in he production of milk and the manufacture of cheese and butter, which dairymen in their private business endeavor are themselves unable to solve and overcome, and whereas the Provincial Government in the past has given liberal assistance to the dairymen for the purpose of assisting in the dissemination of valuable information, and the giving of instruction through itinerant inspectors to both the producers of milk and the manufacturers, and

Whereas the Dominion Government has established the office of Dairy Commissioner for the Dominion charged with the duties of carrying on investigation into economical methods in the obtaining of the finest quality of dairy goods, and whereas this Association in convention assembled heartily recommends to the farmers of the province the advisability of developing the practice of winter dairying, whereby they might add to their profits from cheese-making in summer the enlarged profits from butter-making in the winter, the Creameries Association of Ontario respectfully requests the Ontario Government to continue its financial assistance to this Association upon an increased scale so that the work of the Association might be prosecuted with enlarged vigor and success.

Resolved further that this Association urge upon the Dominion Government, the advantage and need for the extension ot the work of the dairy commissioner by the establishment of branch dairy Experiment Stations under the direct supervision of Prof. Robertson for the purpose of carrying on such investigations into the principles and practices of improved butter-making during the winter by fitting up these stations for that purpose, and by the making of trial shipments of fresh-made butter in suitable packages to foreign markets in order to gain reputation there and to create a demand at the highest prices by demonstrating the excellence of its quality.

Resolved further that copies of this resolution be forwarded to the Hon. the Minister of Agriculture for the Dominion and the Hon. the Minister of Agriculture for Ontario for their favorable consideration,

Mr. JOHN HANNAH.—I would just say in connection with this, that although engaged in the creamery business altogether, I would feel that the cheese factories should pay attention to butter-making in the winter for this reason, that I notice immediately upon the close of the cheese factories the butter drops in local markets, particularly those that are in the centre of cheese districts. Even with creamery butter, we find that is a disadvantage. Instead of earning money, the farmer's wives are wasting good valuable milk, when not used to making butter, and that hurts our local markets. They come in with this rush of poor butter and the quantity deteriorates the price for our creamery butter. Now, if those cheese factories would turn their attention to making butter, we would get over this difficulty. Being in that line of business, they would find a market for an export trade, and I think that the creameries which are running as creameries alone would be gainers in the end. I am scarcely as hopeless in regard to the likelihood of the whole of the butter made in Canada being made in the creameries as some of the speakers seem about it. The Minister of Agriculture, and I think Professor Robertson, took the view that it would be a long time before half the butter would be made in creameries. As I said before, we should also then have some encouragement to work the whole year round.

The resolution was then carried unanimously.

RESOLUTIONS OF CONDOLENCE.

Moved by AARON WENGER, seconded by JOHN SPRAGUE, and

Resolved.—That whereas by the lamentable death of the late James Miller, who in past years rendered this Association good service in the capacity of director, and added much to the interest of its conventions by his genial presence, we place on record an expression of our sense of deep loss by the removal from our midst of our late co-laborer.

Resolved further, that a copy of this resolution be forwarded to Thomas Miller, Spencerville.

The PRESIDENT.—I thank the Association for this resolution, as for fifteen years Mr. Miller lived within a very few miles of Brockville; was one of the most active of our dairymen ; one of the brightest minds we had in this great world ; one that made his cows pay $60 a head, and one that built up and did a great deal in his own locality to uphold the hands of the dairymen in every section of Canada.

Moved by JAMES W. ROBERTSON, seconded by JOHN HANNAH, and

Resolved.—That it is with feelings of deep regret we have learned of the sad decease of the late Mr. Weld, the founder, proprietor and editor of the *Farmers' Advocate*, of London, Ont., and whereas we recognise the energy, integrity and fearless advocacy of the rights and interests of farmers throughout the Dominion, which always characterised his public, life, we hereby place on record our heartfelt appreciation of the valuable services which our late highly-respected co-worker rendered to the people of Canada, and our sincere sympathy with his bereaved relatives in the irreparable loss which they have sustained by the untimely ending of his life.

Resolved further, that the Secretary forward a copy of this resolution to the office of the *Farmer' Advocate.* Carried unanimously

ADDRESS BY MR. I. E. BOWMAN, M.P.

Mr. I. E. BOWMAN, M. P., was then called to address the convention. He said : I am very glad indeed that you told the audience that I was only to address them for a few moments, because I have not a great deal to say to you at this stage of the convention. My good friend asked me to be present and I suppose he thought it was advisable in order that I should learn something about butter-making, and if so I think he was right, because I do no profess to know very much about it, although I have studied it for five or six years and have reached certain conclusions. I would just congratulate the farmers of the county of Waterloo in being so fortunate as to secure the holding of this convention in the town of Berlin this year, and I suppose you will allow me to thank the Creamery Association on behalf of the farmers of Waterloo for coming here and holding their convention in their midst. I am sure that the farmers present could not fail in learning a few things, and allow me just to say here that I think the manufacture of cheese (and now the manufacture of butter) occupies a very important position in the industries of our country. There is perhaps no other industry in which the farmers are interested so much as in the successful prosecution of the butter and cheese trade. Our cheese has obtained a reputation in England greater than butter, but I am confident that we will see the day when Canadian butter will stand as high as any other butter in the world. (Applause.) I highly approve the sentiments expressed here to-day in endeavoring to impress upon the farmers the great necessity of making the best quality of butter it is possible to produce. Our manufacturers find it important to put their wares up in the best possible style Any manufacturer who does not do that falls behind and does not succeed. It is the same with the farmer. It is not only necessary to make the best butter, but it is necessary to put it in as respectable a form as possible. That has a great deal to do with the sale of it. I am speaking of the practice of farmers in making their own butter at home. It is quite true that where a farmer has a wife and lives near a town such as Berlin or Waterloo she can perhaps get as good a price as is going, but these are isolated cases. This cannot be done by the large majority of farmers throughout the country ; and in order to obtain the best results it is absolutely necessary, as one of the speakers told this convention, that it should be made at the creamery. It is impossible for a farmer's wife to have the same facilities and appliances provided with the same care as a company which runs a creamery on a larger scale. So it is not possible, under very exceptional circumstances, to make as good butter at home as in the creamery. Then another advantage which the creameries possess is that they have a large quantity of butter which is of uniform quality, and for that reason better prices can be obtained in all cases ; that is inevitable. I do not sympathise very much with those unfortunate storekeepers who say they have lost money in buying dairy butter. I fully agree with Mr. Wenger that in Berlin and every town of an equal size the merchants ought to join together and have butter sold on its merits the same as anything else. It is done in the Western States and a drygoods man does not buy butter ; not every groceryman buys butter, but a certain merchant makes it his business to buy all the butter that comes in, and instead of stipulating that the farmer should take it out in trade pays over the money. Well, now, if we could only impress upon the farmers the great loss which they sustain in the difference of price of a first-class article which is sent across the ocean and in some of that which is sold for grease, I am quite sure that every farmer would fall in with the idea that it is far better to have the butter made at the creamery. I have taken a little interest in the St. Jacobs creamery; I have not taken any stock; I thought the farmers were able to look after that themselves. That creamery has been decidedly successful in turning out a good article of butter, and I have no doubt in future it will compete with Mr. Wenger. Farmers sometimes think it is a little more convenient to make the butter than to take the trouble to sell the cream. I have not had any experience and cannot settle the question, but what I should like to see is that we should produce the best results, as I am anxious to see we should produce the best results in connection with everything that our country is capable of producing. I hope that every farmer will benefit to the greatest possible extent by the discussions that have taken place and that at some future time the Creameries Association, remembering how well they were treated at Berlin, will come back to hold their convention in our midst. (Applause.)

TESTS AND MILK CANS.

Mr. J. Wilford, after repeating what he had said as to there being nothing in the Crosshill creamery for the owners, said: Last year we manufactured 24,379 pounds. The number of inches of cream were 27,670. It took about an inch to an inch-and-an-eighth to make a pound of butter. Our cream cans are based on the Gurd's creaming system; that is they are twelve inches in diameter and twelve inches perpendicular; each inch is supposed to hold 113 cubic inches and each inch is supposed, if it stands the test of one hundred, to make one pound of butter. We commenced to manufacture on the 29th of May and sold that make at a fraction over twenty cents. We sold June, July and August at eighteen cents and September and October at twenty-two cents. Therefore after our allowance of three and a half cents for manufacturing, the patrons had sixteen and a half cents of the twenty cents, eighteen and a half cents of the twenty-two, and fourteen and a half cents of the eighteen, and up to the present time we have not received a fraction of profit, and I was going to ask the Minister if we applied to the Government would they help us poor fellows up in the west. (Laughter.) During the season of 1890 we had eighty-one patrons.

Mr. John Lackner—What is the least amount we may get this test into a creamery for?

Mr. Wenger—We have a Gurd's oil test. With the churn we paid $70. We got in something like forty-two tubes.

Mr. John S. Pearce—These churns vary in price according to the number of bottles which they contain. We have them all the way up to two hundred bottles.

Mr. Lackner—What vessels do you prefer in gathering cream?

Mr. Wilford—The first two years we tried pine tubs and the last two years we have cans and we find they give us good satisfaction.

Mr. Lackner—What kind?

Mr. Wilford—Double cans.

Mr. Lackner—Did you have them lined with tin?

Mr. Wilford—No.

Professor Robertson—The requirements of a can are first, that is should be a non-conductor so as to keep the cream from being warmed up in transit. There are double tin cans and wooden ones lined with tin. They should have a float to keep the cream from churning and another cover to keep the dust out. This will enable you to get your cream to the factory without injury.

Mr. Wenger—I have used a tank with air spaces all around the sides. I open a tap and run the cream out through that into the cream vat. There are two spaces between the tin and the outside. We carry enough cream to make five hundred pounds of butter.

Mr. Herbison said he had introduced a wooden refrigerator can built square. They are made to hold twenty-five or thirty gallons each. They sit nice and compact in the waggon, and I have had them in use for a season and the weather does not effect the cream in any shape. There is a space of about two inches between the inside tin and the wooden case. We paid somewhere about $9 for a thirty gallon can.

Mr. **Lackner**—Which cost the cheapest the square tank or the large one?

Mr. **Wenger**—I paid no attention to that. When I came to the conclusion that I wanted it I got it. We think the tank is preferable. You have nothing to handle. You have no cans to handle and you hear no profanity around because there has been a big spill of cream. You put on the tube, open the tap and let the cream flow out nicely.

THE LOCAL AUTHORITIES THANKED.

Moved by Aaron Wenger, seconded by Mark Sprague, and resolved, that—

> Whereas the Mayor of Berlin and its enterprising citizens have entertained our members and guests with kindly hospitality, we hereby express our fraternal good wishes for the prosperity of the town and the many interests represented by its large and thriving manufacturing and mercantile concerns.

Mayor **Jansen** replied in appropriate terms.

CLOSING PROCEEDINGS.

At the suggestion of Mr. Isaac Hillborn, Professor Robertson repeated a portion of his remarks of the previous day concerning the silo.

Question.—Would it pay to get a separator for, say, fifteen cows, provided we were raising calves.

Prof. **Robertson.**—I think it would pay to use a hand separator.

Question.—What is the cost of a separator?

Prof. **Robertson.**—You can get a hand separator for $125 and up to $375.

President **Derbyshire.**—Of course our good friend Hunter has a separator but he has a lingering idea that this butter extractor which takes it from the milk at once is better, and that is exactly what we want to do.

A **Voice.**—Would you advise crossing Jerseys, Guernseys and Shorthorns.

The **President.**—I would not do it if it were me, but if asked if I would cross a thoroughbred sire with a breed of grade cows I would say that it will largely influence the quantity of milk given by animals.

Prof. **Robertson.**—If I were asked this question: "Would I cross thoroughbred Jerseys with thoroughbred Shorthorns?' I would say "No" emphatically; but if I were asked whether I would cross thoroughbred Jerseys with a breed of grade cows to improve the butter quality I would say "Yes" emphatically. The feed will largely influence the quantity of milk given by animals and will control the quality to a small extent. The quality of milk as to its per cent. of solids depends mainly on the breed. Jerseys and Gurnseys give on an average about one-half more butter fat per 100 lb. of milk than ordinary animals.

The **President.**—The first thing this gentleman ought to do is to come to a conclusion what he is to do for a living. If he is going to be a practical farmer and wants to get rich and then do something for his country he will select something that will suit his purpose. In my address yesterday I advocated the buying of milk for the value that was in it of butter fat. That is, if the milk contain under two-and-a-half per cent. butter fat he would get paid exactly what it is worth, and if five per cent. butter fat he would get paid for what he delivered. I think that is the fair way. I think that is the basis of this buying and handling of milk and that we will some to it. If a patron of the cheese factory to-day I would get a Holstein cow and put all my energies to getting all the weight of milk I could, and if going into a butter factory I would select one adapted for butter business. If you put into practice some of the very helpful thoughts that have been expressed here, of course our meeting has not been in vain, and we have not failed to accomplish the great desire that we are fostering in our midst, and we have done our duty by the Government that has provided us with funds to do this work. I repeat that we need to change the proportion of our butter made in creameries and in private dairies so that the ninety-seven per cent. will be manufactured in creameries and the three per cent. manufactured in private dairies. Ninety-nine and four-fifths of our cheese made to-day is made in factories. They are getting better factories, better facilities, better selected cows, better ventilation and proper nutritious food. Feed your cows, because your cows cannot do anything without having proper feed, and a cow is worthless of herself. Put your cows in a proper stable, with a little plaster sprinkled on the floors every morning, and have a pure air for your cows to breathe in, and educate all the children to make more and better cheese and butter, and to grow better crops, and in this way build up your houses. Educate your children; give your boys and girls an opportunity of being educated the same as those in other lines of life, so that they can take their place with doctors and lawyers—and feel satisfied with themselves. Have men in parliament that have your interests at heart, men that are in sympathy with your work and will aid you in building up this great country and will do exactly as you desire they shall do. Make agriculturists the head and front of the nation, because upon the prosperity of agriculture the success of all our other industries depend. See to it that you make your position one that will be a power in any country in the world. And I hope you will take advantage of your opportunities. The Agricultural College at Guelph is established for the benefit of your boys. The farmers of every county of this Province are entitled to send one student there free. Get the county council to see that they are sent there. I had my boy sent there. I wanted above all things that he should be an honorable boy, and that, if he was going to be a farmer, he should be educated for it. I sent him to the Agricultural College and I went to that institution and saw Prof. Robertson and the other professors taking hold of him and building him up, and I tell you it is a positive fact that in three years that boy came back an ornament in comparison with what he was before he went there; and I believe every boy in the Province of Ontario who is going to follow farming ought to be sent there. If our young men will avail themselves of the instruction imparted at this institution and as such conventions as the present they will see that we talk exactly what is determined and what we are all aiming at—that we should be a great people—so that we may take the position in other lines which we have taken in our cheese business. They even come from the Old Country to see, and we send our young men over to show them there how to make cheese. We are the first men who sent a travelling teacher from one factory to another. We have a teacher of that kind in connection with this institution. He goes from one creamery to another in order to try to keep up a uniform quality of butter, and you should see that you get the desired instruction. We are determined to take the place that nature designed we should take in this matter. I remember when Brockville butter sold for the highest price of any butter that went to the Old Country, but we found the moment that other countries entered into the creamery business they led right off, and the consequence was that they took the butter trade from us, and we have not got any butter trade at the present time, because we have not been as faithful to our profession as we should have been. I hope after the instructions given at this convention and the intelligent addresses that have been made that every dairyman will go home and stop the leak in the stable floor, in the first place. Do not buy manure from your neighbor; do not buy from the cities artificial manures when all these materials are being wasted in your own stables. Build better stables; get the best cows; have some head for your herd from a stock that have been deep milkers from away back, and then see that the common sense and judgment displayed at these conventions are put into practice. Store up this nutritious corn food for winter and reduce the cost of milk.

This closed the proceedings, and the convention then adjourned.

V

THE FRUIT GROWERS' ASSOCIATION.

STECHER LITH. Co.

A. M. SMITH.

PRESIDENT OF THE FRUIT GROWERS' ASSOCIATION OF ONTARIO FOR THE YEAR 1890

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ANNUAL REPORT

OF THE

ONTARIO FRUIT GROWERS' ASSOCIATION

To the Hon. John Dryden, Minister of Agriculture:

Sir—I have the honor of submitting for your approval the twenty-second Annual Report of the Fruit Growers' Association of Ontario.

In doing so, I beg that you will notice the efforts which are being made by our Association toward (1) the preparation of a complete list of fruits adapted to Canada with values of a perfect specimen of each variety attached, which it is hoped may form a basis for greater uniformity and fairness in judging fruits at fairs; and (2) the preparation of district fruit lists, which may serve as a useful guide to intending planters, by showing what varieties may be successfully grown in the various localities.

I have the honor to be, Sir,

Your obedient servant,

LINUS WOOLVERTON,
Secretary.

Grimsby, October, 1890.

OFFICERS FOR 1891.

PRESIDENT :

J. A. Morton . . . . . . Wingham

VICE-PRESIDENT :

A. H. Pettit . . . . . . Grimsby

SECRETARY-TREASURER AND EDITOR :

Linus Woolverton, M.A . . . . . . Grimsby.

DIRECTORS :

Division No. 1	W. S. Turner, Cornwall.
Division No. 2	John Craig, Experimental Farm, Ottawa.
Division No. 3	D. Nichol, Cataraqui.
Division No. 4	P. C. Dempsey, Trenton.
Division No. 5	Thomas Beall, Lindsay.
Division No. 6	W. E. Wellington, Toronto.
Division No. 7	M. Pettit, Winona.
Division No. 8	A. M. Smith, St. Catharines.
Division No. 9	J. K. McMichael, Waterford.
Division No. 10	A. McD. Allan, Goderich.
Division No. 11	T. H. Race, Mitchell.
Division No. 12	N. J. Clinton, Windsor.
Division No. 13	G. C. Caston, Craighurst.

AUDITORS :

James Goldie . . . . . . Guelph.

J. M. Denton . . . . . . London.

THE ANNUAL MEETING.

The annual meeting of the Fruit Growers' Association of Ontario, was held in the City Hall, Hamilton, on Tuesday evening, the 16th December. 1890.

The President, Mr. A. M. Smith, of St. Catharines, took the chair at 8 o'clock p.m., and introduced Mr. D. McLellan, mayor of the city, whose remarks are here reportep in brief, owing to the absence of the official reporter.

The mayor said that when he received a letter from the secretary of the Association, asking for the use of the council chamber for this meeting, he had at once placed it before the city council, and it had received the hearty sanction of that body. He regretted that there was not that evening a larger local attendance of the citizens of Hamilton to show the interest they take in the progress of horticulture and agriculture in our country. He thought that the Association had done a wise thing in choosing the city of Hamilton as their place of meeting, because this city was situated in the very heart of the best fruit region of Ontario, and near to the Niagara district, which is so well and so favorably known on account of its great adaptability to the culture of our finest varieties of fruits. By such meetings as these, and through the interesting and valuable reports of them which were scattered so widely by the Department of Agriculture, the Association was advertising the capabilities of this province throughout the whole world. The agricultural delegates of the British farmers who had recently visited this country, had carried away with them the most favorable impressions of the agricultural and horticultural resources of this province. He was aware that no very lengthened address was expected of him at this time, and he would therefore simply extend to the Association a most hearty welcome on behalf of the citizens of Hamilton.

The President replied on behalf of this Association, thanking his worship the mayor, and through him the citizens of Hamilton generally, for the kind welcome, which had just been extended to them. On coming to this city the society felt that they were in a sense only coming home again, for it was its birthplace, and for this reason, as well as because of the general interest always manifested here in their work, the members felt more at home than in any other city in the province. The president closed his remarks with some complimentary expressions regarding the beauty of the hall which the city had so freely placed at the disposal of the association.

THE TREASURER'S REPORT.

After the minutes of the last annual meeting were read the Treasurer's report was presented as follows:

Receipts.	$ c.	Expenditure.	c.
Balance on hand last audit	231 86	Plant distribution	291 86
Members' fees	2,012 35	Canadian Horticulturist	1,598 01
Government grant	1,800 00	Chromo lithographs	233 00
Advertisements	296 87	Electrotypes	73 78
Back numbers and bound volumes of the Canadian Horticulturist	43 18	Directors' expenses	464 36
Petty receipts	1 17	Express and duty	230 45
		Printing and stationery	76 38
		Postage and telegrams	85 61
		Commissions	85 08
		Care of rooms at meetings	12 60
		Stenographer	128 15
		Discounts	14 05
		Exchanges	4 60
		Advertising meetings	3 00
		Salary Secretary-Treasurer, Editor and office clerk	1,000 00
		Balance on hand	84 50
	4,385 43		4,385 43

To the President and Directors of the Fruit Growers Association:

Gentlemen,—We, the undersigned, appointed to audit the receipts and disbursements of the Secretary-Treasurer for the year ending December, 1890, beg to present the following report:

We have examined the vouchers, compared them with the items of expenditure, and find them correct, showing a balance deposited in the Canadian Bank of Commerce, Hamilton, of $84.50.

Your auditors wish to bear testimony to the careful manner in which the books of the Association are kept.

JAS. GOLDIE, }
J. M. DENTON, } Auditors.

Hamilton, December 16th, 1890.

Upon motion the treasurer's statement and the audit thereof were duly adopted.

THE PRESIDENT'S ANNUAL ADDRESS.

Gentlemen,—In pursuance of a time-honored custom it becomes my duty to review the labors of another year, or in other words to give an account of our stewardship, and to present some thoughts upon horticultural topics that may be of interest. Although the origin and advancement of our association has frequently been alluded to in the annual addresses of my predecessors in office, I feel that it would not be out of place in again meeting here in the birthplace of our society, to glance a little farther back than over the year which has just passed, to the time when our existence began and note the progress and advancement we have made.

Nearly thirty-two years ago, or, on the 19th of January, 1859, in the board room of the Mechanic's Hall in this city, was organized what was then called the Fruit Growers' Association for Upper Canada; which name was afterwards changed to the Fruit Growers' Association of Ontario. The late Judge Campbell of Niagara was its first President He died within a year and there was no re-election of officers till the 16th of

January, 1861, though there was a meeting for show of fruit and discussion of fruit topics in October previous, at which time my connection with this association began. I think I have only been absent from two of its annual and five or six of its other meetings since that time. There were seventeen members at this meeting, quite a show of fruit, and a good display of enthusiasm, besides some rambling discussion, and it was decided to hold a meeting for the election of officers on the 16th of January following, which was accordingly held. At this meeting the late Judge Logie, of Hamilton, was elected president, which office he held till the year 1867, when he was succeeded by the late Wm. H. Mills, of this city. During this period meetings were held two or three times a year, at various places, for show of fruits and discussions upon topics connected with fruit culture, which brought out a great amount of useful information and no doubt helped to lay the foundation of success in fruit culture which followed, though the meetings were often but poorly attended, and the membership of the society had only increased to thirty members. Fruit growing for profit was little thought of in Canada at that time, except by a few persons in the Niagara district, and a few other favored localities. In fact it was a question in many parts of the country, where fruit is now grown largely for market, whether it could be grown at all or not. Many had planted different varieties in many localities on the recommendation of traveling agents which were not adapted to the country and their failure had discouraged them and others from planting. During the year 1868, through the efforts of Mr. Mills an his co-laborers, the society was incorporated under the Society and Arts Act, and became entitled to receive from the public funds a yearly grant of $350. This enabled us to collate, publish and distribute the information gathered in our society and also adopt a system of sending out plants and trees to the different members in various parts of the province for trial, and this has been productive of a vast amount of good in showing what varieties are and what are not adapted to different localities. From that time forward, our labors have been a continual success. We have held our meetings in nearly every part of the province, thus arousing local interest in the work, and encouraging farmers and others to plant fruit. The Government, seeing our good works, have from time to time increased our grant to enable us to carry out special plans for the advancement of this interest; notably our exhibits of fruit at the Centennial Exhibit on in Philadelphia and the Colonial in England, which did more to attract attention to Canadian fruits and place them in the position they now occupy, in the front rank of the best markets of the world, than all other causes combined. In thus attracting attention to Canada as a fruit country it would naturally be suggested that a climate adapted to fruit growing would be a desirable one to live in and thus I have not the least doubt that we have been instrumental in bringing many settlers from other countries to Canada.

Another scheme, which our Government grant has enabled us to carry out, has been the publishing of our *Canadian Horticulturist*, a medium through which a vast fund of useful information is conveyed to our members and many of the general public besides, and under the management of its present efficient editor it is constantly growing better and its usefulness is extending. I need not say this to the members, who all receive it, but to those here who are not members I would say join our association, if for no other reason than in order that you may have the *Canadian Horticulturist*.

Our membership has increased from the little group of 30, in 1868, to over 2,000, and we have the proud satisfaction of being the largest horticultural society in America, if not in the whole world; while the culture of fruit throughout the country has made corresponding advancement. Our towns and cities which were formerly largely supplied from the neighboring republic are now abundantly stocked with fruits of our own growing, and many sections of our country to which apples were sent from the States and Niagara district thirty years ago, are now exporting thousands of barrels annually to the old country, and even to the United States, and that of a quality, too, which can not be excelled or even equalled in the whole world. And by careful hybridizing and judicious selections, varieties have been found that will succeed in many sections where it was thought fruit could not be grown, and, if experiments and plans which are now under way succeed, and I have every confidence that they will, the day is not far distant when every inhabitant of Ontario, if not of the Dominion, who has land capable of being tilled, if he cannot sit "under his own vine and fig tree" may at least, if he choose, raise enough of some kinds of fruit to supply his own table.

Great improvements have been made also in the methods of handling fruits and in packages. Thirty years ago, when I used to attend the Hamilton market, berries of all kinds were brought in in pans and pails, and dipped out with the hand or with ladles into measures, often in a condition ready for jam. Apples, pears and sometimes peaches if not too soft were marketed in grain or meal bags, which had frequently not been very well shaken—the bags I mean—the fruit had plenty in being got off the trees and over the rough roads in lumber wagons—there were no express offices between St. Catharines and Hamilton, or that place and Toronto, I think; but now we have attractive baskets and packages for every kind of fruit and it is carefully conveyed in spring wagons to the railway station where express agents are ready to receive and forward it to its destination. But, notwithstanding the progress of fruit culture there have been many discouragements and hindrances to contend with. Blight, fungus, mildew, yellows, black-knot, frost and insects of various kinds, often step in and cut off our crops and blast the hopes of fruit growers, and they have to be ever on the alert to protect themselves from these enemies. The methods and experiments in combatting these evils, brought out in discussions at our various meetings and communicated to the public and others, through our *Horticulturist* and Annual Report, have been of incalculable benefit. There has not only been a great advance in fruit growing during the last thirty years but also a great advance along all other horticultural lines, particularly in the rural districts. There is more taste displayed in laying out and beautifying grounds, in planting trees, shrubs and flowers; in making homes attractive, than previously, and we believe that the Fruit Growers' Association of Ontario has done much in the development of this taste and in bringing about these excellent results. The year that has just passed, has been a very discouraging one to many of us, particularly to growers of apples. Although the spring opened with an abundance of bloom and there was every indication of a bountiful crop, there came a cold east storm which blasted the fruit and entirely destroyed it through the middle and southern portions of Ontario, except in a few sheltered and favored locations. The counties of Huron, Bruce, Grey and a portion of Simcoe were the only ones which had any apples of any account to export. The same storm nearly destroyed the peach crop also, and in many sections the plum and cherry. Pears have been a medium crop, and the grape crop simply enormous, yielding five to six tons to the acre and some varieties even as high as eight to ten tons. Small fruits have been a fair crop and all kinds of fruit have brought good prices. On the whole, fruit growers have been as successful as any other class of agriculturists. I think, however, that this season will demonstrate the fact that it is not wise for those whose only income is from fruit, to depend altogether upon one kind. "Don't put all of your eggs in one basket." Many an orchardist, who has depended solely upon his apples or peaches this past year, finds himself in a bad position, while those who have had an assortment of fruits have had something to fall back upon.

Now a word about our labors for the past year. Besides the issuing of our *Horticulturist* and annual report, we have arranged a list of the varieties of apples adapted to Ontario, showing their relative values, hardiness, productiveness, quality etc., establishing a scale of points for judging fruit at fairs, which we think will be of great value ; we have held two meetings for the show of fruits and discussions a full account of which will appear in our next annual report. These meetings have been well attended by our own members and their friends, besides we have had several prominent horticulturists from the United States to give us the benefit of their experience, so that, altogether, the report of 1890 may be looked for as one of great value. We have distributed over 2,000 trees, vines, and plants to our members for trial, and let me here emphasize that word *trial*, for I fear too many of our members think these trees and plants are given just as an inducement for them to become members, or as a gift, and as they cost them nothing they do not give them the care and attention they should. This is not the object for which they are given ; they are given you for *trial*. They are generally new and untried varieties and we wish to have them tested in different sections of the country and upon different soils and locations and careful reports made upon them for the good of the country at large. So, if they are valuable, others can plant them and if they are not suited to one section, let it be known, so that others in that section will avoid planting them. We consider that you get your dollar's worth from the *Horticulturist* and report and that you should do this testing for the good of others.

Another work which many of the prominent members of the association have been engaged in and which I think will be productive of much good, has been the visiting of farmers' institutes throughout the province and taking part in the discussions upon horticultural subjects, imparting what information they could in relation to fruit growing. During the year we have had a Dominion convention of fruit growers which many of our members attended, and at which many questions of interest were discussed.

Perhaps the most important was that of shipping and marketing. Agents of different transportation companies met us and listened to our grievances and suggestions, and they manifested a desire to furnish us better facilities and greater dispatch in shipping our fruits. I believe, as a result, there has been an improvement in this respect during the year, though I think we have just cause to complain yet of the way our fruit is handled by some of the express companies, and their want of proper accommodation in their cars, which are generally destitute of shelves for storing fruit. Slight baskets are piled one upon the other in such a way that frequently when it comes off the car it is in better condition for pigs than for placing upon the market. There is another grievance in connection with the express companies which I think it the duty of thts Association to look into and try to have remedied. I refer to the petty pilfering of fruit from baskets and packages while in transit. I presume there is not a shipper who does not receive complaints every year from his customers of weight or measure being short, or baskets being broken open and fruit abstracted. The loss is generally so small that if he is very busy he does not take the trouble to report it, and if he does he seldom gets any satisfaction. The large shippers do not often notice it, but it comes especially severe on the small dealers in country towns and private individuals who are getting a few baskets for their own consumption. As a case in point, I was stopping a few weeks in the little town of Brussels last fall during the grape season, and a *widow woman* living there who made her living by selling fruit and confectionery wanted me to order her up some grapes for retailing, 100 pounds or so at a time. I did so and when the first lot came up she reported them five or six pounds short. Thinking there might possibly be a mistake on the part of my shippers I deducted it from her bill and let it pass. On the arrival of the next shipment I happened to be in her store when they were delivered and noticed that some of the baskets had been broken open. I took one and weighed it and found that there had been stolen over three pounds by actual weight. I showed it to the agent and he reported it to the superintendent of the company, and that is the last I have heard about it. There was from 20 to 30 cents' worth on each shipment taken from this poor woman's hard earnings which would in two or three weeks amount to several dollars and she had no means of redress. If there had been that amount taken from a money or from any other package of value there would have been an investigation and restitution, and the guilty parties punished. Why should not property in fruit be respected as well as in any other commodity? I trust there will be a committee appointed to look into and remedy this evil.

While we congratulate ourselves upon the achievements of the past we must not forget the duties of the present. There are many evils to remedy, wrongs to be righted, errors to be corrected, in the horticultural line as well as in others, and while we have made advancement in the past we must not forget that we are far from what we ought to be considering our advantages. There is not a country in the civilised world that has a better soil and climate for growing apples, pears, plums, cherries and many varieties of grapes in perfection than we have, to say nothing of small fruits, yet there is not one farmer in ten, take Ontario through, that grows half of these fruits required for his own use even. I have travelled through some of the best fruit sections of the province during the past year, been upon the farms of some of our most prosperous farmers and enjoyed the hospitality of their homes, and I was surprised at their want of horticultural taste and knowledge. Even where every other surrounding was all that could be desired, as good buildings and fences, good horses and cattle, good roots and grain, well tilled fields, yet when you looked for the orchard, the fruit or the flower garden or the lawn, they were either wanting or in a very neglected condition; and while their tables were well supplied with the substantial and luxuries of other kinds, there was a noticeable absence of what, to me, is an indispensable diet—fruit. I may be wrong in my ideas about food but I have often thought that if farmers would eat less fat pork and more fruit they would be healthier and happier if not better looking than they are. This would certainly be the case if there is truth in the adage that "like begets like." But about the healthfulness of fruit, there can be no doubt about the elevating influence of horticultural pursuits, and I believe it to be the duty of every member of this Association to do all he can to interest and instruct his neighbors in these pursuits both by precept and example. Show them your own well-kept grounds stocked with the best trees, shrubs and plants that your means will afford, give them a taste of your best fruits, ask them to attend our meetings, show them *The Canadian Horticulturist* and annual report, and persuade them to become members of our Association. I believe if our farmers could be induced to take more interest in these things, and surround their homes with these attractions, we should hear less complaints about their sons and daughters leaving the farm to engage in other pursuits. Perhaps I am taxing your patience, still I would like to say a word in regard to varieties of fruits and their improvement.

If we look over the thirty years of the past we can recollect a great many varieties, particularly of grapes and small fruits, that have been introduced to us with a "great flourish of trumpets" by their friends or persons interested in the sale of the plants, which have been received and cared for at great expense, and we have found that a majority of them, like some of the human species, have not improved on acquaintance, and we have been obliged to discard them, while a comparative few have come to stay, and are an improvement on the older varieties. These have amply repaid us for the time and money bestowed upon them, still we can but feel that this continual testing of new varieties is a constant strain upon our time and purse, and as testing new fruits is a work that benefits the whole country I do not see why our government should not assist us in this work. But it may be said by some that we have agricultural and experimental farms already for doing this work, at Guelph and Ottawa. I would ask what can be done at either of these places in testing tender varieties of apples, pears, plums or cherries, much less grapes, peaches, apricots, nectrines, etc.? I know that Professor Saunders and his staff are doing a great work in bringing out varieties adapted to the colder parts of the province, and his experiments in hybridizing strawberries, raspberries, gooseberries, currants, etc., will undoubtedly be of great benefit to us here. I had the pleasure, during the raspberry season, of visiting the experimental farm at Ottawa and seeing some of the marvellous results of his labors and testing. Of the hundreds of varieties of this delicious fruit which he has produced by hybridizing and the careful selection of varieties, and I have no hesitation in saying that many will prove superior in many respects to anything that we now have in cultivation, and I think the same will prove true in many other of his fruits. I sincerely believe that the results he has already achieved will more than pay the country for all the expenses incurred in the horticultural department of the experimental farm, and his work has but just began. I believe if we had an experimental ground carefully conducted somewhere in Southern Ontario, where our tender fruit trees, shrubs and plants could be grown and tested, and where only varieties that were worthy of cultivation would be recommended, it would be a great boon to the country, and in 30 years more we would make much more rapid advances in the improvement of varieties than we have in the past. I hope that a committee will be appointed by this Association to interview the Government upon this subject.

It gives me much pleasure to meet my co-laborers here in the city of Hamilton again, and although I do not see many faces that I met here thirty years ago, it reminds me of them and of the many pleasant meetings we have had here. It reminds me too that many of them have passed away. Only a few of the original founders of this society are left; their places have been filled by other workers, and some of them have been called also. During the past year we have lost one from our board of Directors whose genial, kindly face will be missed by all; ever active in the discharge of duty, cheerful, jovial and true as a friend, the name of John Croil will ever be revered by the members of this Association. We have sustained another great loss in the death of Wm. H. Mills of this city. It was largely through his efforts that we became incorporated and received the Government grant, and although since his retirement from office he has not taken an active part in our meetings, he has had a deep interest in our success, labors and welfare as evinced in his generous donation of his entire stock of his hybrid grape, the Mills, which will be distributed to the members of the Association next spring. Not only this Association but the horticultural world has met with a great loss in the death of Charles Gibb, of Abbotsford, Quebec, whose whole life was devoted to this pursuit, and whose labors and researches have done more to secure fruits adapted to the colder parts of our country than those of any other man. Another prominent horticulturist across the line, to whom we are much indebted and whom many of us knew, and whom to know was to respect and love, and who has done as much probably for this cause as any man in the United States, has gone. I refer to Patrick Barry of Rochester, N.Y., who has long been the honored president of the Western New York Horticultural Society. We mourn with them his loss. Thus one after another of our workers pass away, but the fruits of their labors live after them—more enduring monuments than those of marble or granite—to perpetuate their memory. May their mantle fall on us, and when our work here is finished may those who are left behind point to some rich results of our labors.

On motion it was resolved that this Association hereby express its appreciation of the excellent address just given by the President, and refer the points touched upon to the consideration of a committee hereafter to be appointed.

COMMITTEES.

A nominating committee was appointed to nominate the officers for the coming year, consisting of Messrs. M. Pettit and D. Nichol appointed by the chair, and Messrs. P. C. Dempsey, W. E. Wellington and J. K. Leslie appointed by the meeting. This committee reported as follows:—

President—J. A. Morton. *Vice-President*—A. H. Pettit. *Directors*—1, W. S. Turner; 2, John Craig; 3, D. Nichol; 4, P. C. Dempsey; 5, Thos. Beall; 6, W. E. Wellington; 7, M. Pettit; 8, A. M. Smith; 9, J. K. McMichael; 10, A. McD Allan; 11, T. H. Race; 12, N. J. Clinton; 13, G. C. Caston. *Auditors*—Jas. Goldie and J. M. Denton. After these names had been voted upon *seriatim* the report was adopted.

At a meeting of the directors held subsequent to the election, L. Woolverton, of Grimsby, was re-appointed secretary-treasurer and editor of the *Canadian Horticulturist*

The following committees were appointed by the chair, viz :

Fruit Exhibit.—A. McD Allan, John Craig and A. Alexander. *Legislation.*—T. Beall, P. E. Bucke and G. C. Caston. *New Fruits.*—W. E. Wellington, M. Pettit and A. M. Smith. *Special.*—P. C. Dempsey, Jas. Goldie and the secretary.

Communications were read from Prof. Saunders, regretting that he could not arrange to be present, from the Hon. J. M. Gibson and the Minister of Agriculture and others expressing their intention of being present.

The Secretary stated that he had received a letter also from the Department of Agriculture, to the effect that it was the intention of the department to bind in cloth a sufficient number of copies of the report to supply all actual members of the association, This statement was received with great satisfaction.

REPORT ON NEW FRUITS.

The following paper on new fruits, that have been brought under his notice, was read by the Secretary :

It will be gratifying to the board of directors, and others interested, to know that some work is being done each year by our association in recording the origination of new and promising varieties of Canadian fruits, as well as in testing the suitability of highly commended varieties of foreign origin.

In apples particularly, there have been quite a number of very promising varieties sent in to me for my opinion, some of which I have forwarded on to the other members of the Committee, and others I have noticed in the *Canadian Horticulturist* without that precaution. I will now give you a list of these, in order that a record of them may be kept in our report, pending farther test of their merits.

Wilson's Seedling.—A magnificent fall apple of very large size and fine color, found growing by the kitchen door in Mr. B. Willson's yard in Wingham, and sent in by Mr. J. A. Morton. The tree grows vigorously, and has a rather compact, bushy head.

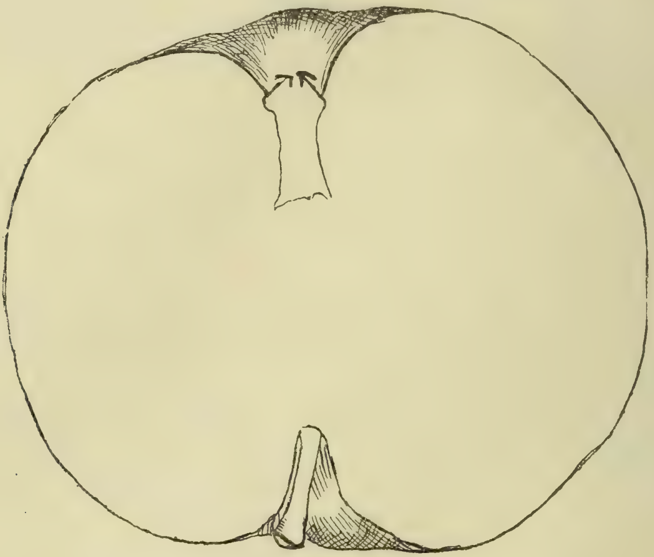
Description.—Size, very large ; form, conical ; skin, yellowish, spattered and shaded with very bright red on the sunny side ; stem, set in a moderately deep, even basin ; flesh, yellowish white, somewhat inclined to water core, tender and of a pleasant flavor. A good cooking apple. Season, October.

The Haliburton.—This apple was sent me by Messrs. Cavers Bros., of Galt. for an opinion. It appears to be a local apple grown for some years in the township of Haliburton, under that name, and possesses sufficient beauty of appearance to merit notice. The description of the apple given below was prepared by Prof. Saunders.

Grown north of Peterboro', size medium or under, $2\frac{5}{8}$ x $2\frac{1}{8}$, form oblate, color pale yellow, nearly obscured on the side exposed to the sun by carmine red, marked with splashes and streaks of a deeper hue. Stalk short and moderately stout, set in a small but rather deep cavity, calyx open with a very shallow smooth basin. Flesh fine grained, creamy white and more or less tinged with pink, rather soft in texture, austere and with an acid taste, with very little flavor, a pretty apple, but of poor quality. Ripe latter end of September.

Green Fameuse.—An apple sent me by Mr. R. W. Shepherd, jr., of Montreal. He says the original tree is some twenty-five years of age, and is growing on his farm at Como. The fruit is larger than the Fameuse proper, and he describes it as being a heavy bearer, and very little, if, any given to spotting. In other respects it seems to have all the qualities of the Fameuse as generally known, with the exception of color. This seems to be its chief lack to make it very desirable.

Renaud's Seedling.—A winter apple of great promise, sent in by Mr. Robert Hamilton, of Grenville, P.Q. It is a chance seedling, found growing on the farm of Mrs. Renaud, Grenville, and is now about eighteen or twenty years old, a fact which points out its undeniable hardiness, for Grenville is about north latitude 45½, on a line with the Parry Sound district. We have for this latitude plenty of good fall apples, but a real first-class winter apple is the disideratum. Possibly in this seedling the want may be supplied. The apple appeared to me to possess four important points of excellence, viz :—size, beauty, productiveness and hardiness. I have therefore made a drawing of a section of it to give some idea of its exact size and shape.



Section of Renaud's Seedling.

Description.—Size, large ; form, roundish, with three or four more or less prominent ribs ; skin, green, almost completely striped and splashed with bright red ; stem, medium, in a small snug cavity ; calyx closed, in a smooth regular basin of moderate size ; flesh creamy white, firm, of a pleasant vinous flavor ; quality, good ; season, March to July.

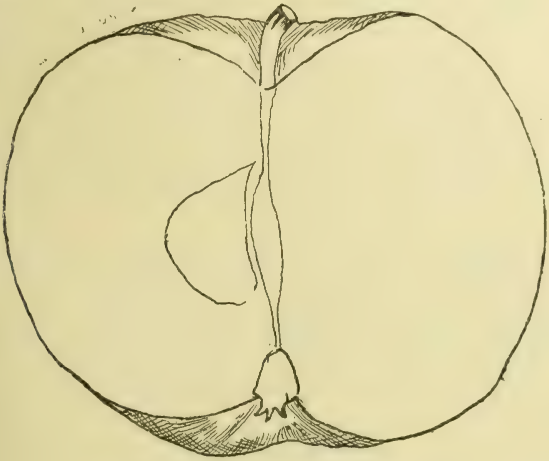
McMillan's Seedling.—This apple, sent me by Mr. J. P. Cockburn, Gravenhurst, originated in the county of Stormont, latitude nearly 46, and is the product of a seedling tree twenty years planted. It evidently has the merit of hardiness, and it is for a list of hardy apples that we can commend that we are at present looking. It is a fine looking fall apple, and would be an ornament to any table for the dessert dish. One great point in its favor, for these days, is that it does not appear to have the least tendency to spot, a grievous fault with many of our otherwise excellent dessert apples.

Description.—Size, medium ; form, oblong ; skin, yellowish white, almost completely blotched and dashed with bright red, much deeper on the sunny side ; stem, slender, three-quarters of an inch in length, set in a deep, narrow cavity ; calyx closed in a very small wrinkled basin ; core open and seeds free ; flesh, white tinged with pink, prominently marked toward the apex, tender, mellow, fine grained, not very juicy, with a good flavor, somewhat of the Fameuse character ; season, October. Promising.

The Golden White.—I have received from R. Brodie, Montreal, two fine samples of the Golden White, one of the most promising Russian apples. It compares favorably in beauty with the Duchess of Oldenburgh, ripens later in the season, about the first of October, is rather large in size and would sell at top prices in our markets. Surely if our friends in the northern sections can grow such apples as Yellow Transparent, Duchess of Oldenburgh, Golden White, La Rue, Wealthy and Renaud's Seedling they have as good prospects for success in apple culture as we who live in more favored sections.

Professor Saunders, director of the Experimental Farm, Ottawa, describes this apple as follows :—Golden White, from Moutreal, said to be of Russian origin. Size large, 3¼ x 3⅛, form nearly round, unevenly ribbed, color reddish yellow but almost concealed by pale red with numerous splashes and streaks of deeper red in which are many pale dots, stalks short and fairly robust, cavity small but deep, calyx of medium size, partly open in a rather strongly ribbed basin ; highly perfumed ; fresh creamy white with a slight tinge of pink, rather soft and a little coarse in the grain, crisp and moderately juicy, mildly acid and highly flavored ; quality good ; core of medium size. A pleasant apple to eat and would no doubt cook well. Ripe latter end of September.

HENDERSON'S SEEDLING.—Mr. G. G. Henderson, of Hamilton, sent in to me a very pretty apple, which he says is a splendid keeper. It certainly is an apple possessed of excellent flavor and if it averages on the tree anything like the sample sent in to me it is worthy of a place among our winter dessert apples. I have drawn a section of it to accompany this paper.



SECTION OF HENDERSON'S SEEDLING.

Description.—Size medium, form oblate, regular, except that it is obscurely ribbed skin a beautiful creamy white, ground striped and splashed with pink, shading into a deep red on the sunny half ; calyx closed, setin a medium sized, somewhat rugged basin ; stem very short, in a broad shallow cavity; flesh snow white, tender, juicy, with delicate aromatic flavor ; quality very good. A winter apple, exact season not determined. A sample of this apple shown at our winter meeting was much inferior to the one first sent me from which the above description was prepared.

RUSSIAN APPLE BERESINSKOE.—Distributed in 1885. Mr. F. W. Coate, of Cape Elizabeth, Rosseau, sent me this apple saying with the following note :—"In 1885 I selected from the Fruit Growers' Associations's list of premium plants a Russian apple tree, Beresinskoe. I received and planted the little tree on the 13th May. This year it has borne for the first time 17 apples. I send you by mail six of them that you may judge if the beauty and quality of the fruit is worth notice in *The Horticulturist.* This apple is described by Prof. Saunders as follows :—Beresinskoe (?) probably Berezinskoe= Beresina. Size medium, 2½ x 2½, form nearly oblong, color pale greenish yellow, with a bright red shading on the part exposed to the sun, and a few dots and streaks of deeper red. Stem long and rather slender and set in a moderately deep cavity, calyx nearly closed, in a shallow, strongly ribbed basin. Flesh yellowish white, more or less watercored, of moderately fine texture, a mild, nearly sweet character, with an agreeable but not high flavor. Core large. The specimens are too ripe to admit of accurate judgment as to quality, but it would probably be entitled to rank as good. A pretty apple, would make a nice dessert fruit and would probably cook well.

Clark's September Cherry.—Mr. E. D. Arnaud, of Annapolis, N. S., sent me a box containing some samples of this singular cherry in excellent condition, considering their long journey. There is but a single tree and it is growing at Lower Granville, near Annapolis. The fruit is about the size and shape of the Kentish and when fully ripe of a dark red color. The flesh is firm and of a sweet and very agreeable flavor. It might be a very valuable shipping cherry.

The William's Strawberry.—In small fruits there is little to report. One strawberry of considerable apparent merit has come to the front under the name of the Williams. Samples of this berry were sent me by Mr. David Grey, of Canesville, and afterwards some were shown at our meeting at Niagara by Mr. Lee, of Virgil. It was raised by a Mr. Williams, of Burford and among strawberry growers in Brant county it has by all accounts become very popular. It is said to have been raised from the Crescent seedling, fertilized with Sharpless. It is said to be an enormous bearer of very large berries which must be allowed to ripen well before gathering or it will show some traces of the white tips of its male parent. Compared with Sharpless it is claimed that it will bear four times as heavily ; it is also stated by Brantford growers that the berries are as large as those of the Jessie, and that the plant is much hardier. Certainly from the samples sent me and those shown at our meeting this berry has considerable merit, and, in order that it may be further tested it has been placed on our list for distribution in the spring of 1891.

Sutherland's Seedling Gooseberry.—Samples of this gooseberry were sent me by the originator, Mr. George Sutherland, of Meaford. It is a seedling probably of the Downing. It has borne four crops and so far has proved itself to be an enormous cropper and free from any sign of mildew. The bush is a strong, upright grower and the berries are large and light green in color. I was not very favorably impressed with its quality, still it might be a profitable berry to grow for market where fruits so often sell more by appearance than by quality.

Our Russian Importation.—Not the least important of our labors during the past year in the introduction of promising new fruits is our Russian exchange. Through our Russian friend and correspondent Mr. Jaroslav Niemetz, of Rovno, Wolinia, Russia, who, I may add, has himself become a member of our association, I have succeeded in obtaining a large box of scions of the best varieties of Russian apples, pears, apricots, etc. In order that we may make an independent test of their value the greater part of these importations I have placed in charge of the Central Experiment Farm for propagation and testing on condition of our receiving a reasonable share for distribution.

I am just in receipt of a communication from Mr. John Craig, horticulturist of that farm, in which he gives a full list of the varieties I have sent him and the number of grafts of each kind he has succeeded in raising. I subjoin this list in full from which it will be seen that there are some three hundred and sixty young apple trees growing, sixty eight pear and fifteen plum trees.

Among the apples Mr. Niemetz has especially called our attention in the *Canadian Horticulturist* to the Antonovkas and the Synaps. He also sends an apricot which he regards as the most hardy that is known in Russia. It is called the Anjustin's apricot and has been fully treated of in our journal, where he shows that more hardiness may be expected to characterize it than does the Russian varieties that were brought over by the Mennonites. There were also a lot of 50 small cherry trees of a variety called Koslov Moreleo, which have also been described in our journal. Forty of these also have been passed over to the Central Experimental Farm for propagation and testing. Should they prove valuable for northern Ontario steps will be taken to secure a sufficient number in the course of time for distribution to our members.

List of one year old grafts from scions imported from Russia by the Fruit Growers' Association of Ontario, spring of 1890 and propagated by Mr. John Craig, of the Central Experimental farm, Ottawa.—

Stone Antonovka	Gov't Tchernigov	36
" "	Koslov	1
White "	"	7
Antonovka	Grell	2
"	Ansjustin	10
"	" 15 A	4
"	" 15 B	9
Aport	Solovieff	7
"	Grell	20
Arkad	"	56
"	Solovieff	17
Bieloi naliv	Grell	25
" "	Solovieff	21
Naliv	Ansjustin	10
Korobov	Solovieff	16
Skrisch apple	Grell	14
Miron	"	17
Skrut	"	18
Lebedka		62
Koritchnevoe		89
Miron	Solovieff	43
Gul pembe	Niemetz	20
Golden Stone	"	25
Borodovka	"	18
Dvinnoe	Solovieff	23
Putim 37 B gov't of	Tchernigov	12
" 36 A "	"	6
Putim	Koslov	2
Lapouche.	"	15
Pana	Niemetz	3
Paperovka		11
Russian Tyrol		36
Steklianka		13
Zolotoreff		12
Chelibi	Niemetz	15
Sommitelnoe	Grell	45
Plodovitka	Koslov	95
Plodovitka	Solovieff	19
Anis	Grell	0
Naliv	Ansjustin	10
Gruschevka	Solovieff	16
Kara—Synap A	Niemetz	32
Kara—Synap B	"	63
Sari—Synap	"	92
Skrosnina	Grell	8
Sklanka		24
Vargulek		3
Plikanoff		81
Titovka	Koslov	99
Titovka	Solovieff	9
Without name	"	19
Name lost		6
Gremuck	Niemetz	17
Borovinka		8
Pear.—Ukraine Bergamotte		8
Hamburg " and Ogust excell (mixed)		6
Krasorka		6
Ilinka		1
Gleck		23
Salviate	Ansjustin	24
Plum.—Niemetz		15

REPORT OF THE SPECIAL COMMITTEE.

The following report was handed in by the Special Committee :

Whereas, during the past year, the horticultural interests of our country have sustained a serious loss in the death of three prominent Canadian horticulturists, namely, Mr. Charles Gibb, of Abbotsford, Que., a scientific student and experimenter, who by his travels and researches has already very much enriched our Canadian literature and whose death in the prime of life occurred at Cairo, in Egypt last March ; Mr. W. H. Mills of Hamilton, a former president of our Association, whose labors, as a hybridist, have rendered his name widely known; and Mr. John Croil, of Aultsville, who has been a true and faithful director of our Association for many years; also of one of the leading American horticulturists, Mr. P. Barry, of Rochester, president of the Western New York Horticultural Society. He has been long a member of our Association and has ever shown himself ready to give us the benefit of his extended knowledge of pomology.

Therefore, resolved that we, the members of the Fruit Growers' Association of Ontario, desire to record the high esteem in which these gentlemen have been held by us, the deep and unfeigned sorrow with which we received the sad news of their removal from our midst and the great disappointment with which we regard the loss which our favorite industry has thereby sustained.

THE WINTER MEETING.

The Winter Meeting was held in the Music Hall, Windsor, on Wednesday and Thursday, December 11th and 12th, 1889.

The President, A. M. Smith, Esq., took the chair at 2 p.m., and opened the meeting by a few remarks expressive of his pleasure at seeing such a large audience, and especially at seeing among them a number of friends from the American side, among whom he noticed with much satisfaction President Lyon, of the Michigan Horticultural Society.

THE ONTARIO FRUIT LIST.

There being no questions awaiting answers, the discussion of the Ontario Fruit List, presented by a Committee of the Association was proceeded with.*

Mr. **Beall** (representing the Committee).—The Fruit List which is about to be discussed is a matter that has been under consideration to some extent for a number of years, but it is only of late that it has assumed a practical form. The Committee has been at a great deal of pains in getting at the matter, and have spent much time upon it, but up to the present they have only succeeded in classifying apples alone, so that the report this Committee proposes presenting may be looked upon as a report of progress rather than a full report. It is hardly to be expected that the list we are about to present will meet with the approval of everyone, as great differences of opinion exist in regard to the relative value of apples for different purposes, but those present will have an opportunity of making changes if desired. We have done away with many of the old style headings. We have only four, the first of which is the season, in regard to which there has been in the past great difference of opinion. The second heading is the quality of the apple, which is subdivided into dessert and cooking, which we believe will embody all that is necessary to be known respecting the quality of an apple. The other two headings are value for home market and value for foreign market. I do not think it is necessary for me to read over the whole list, but as it is arranged alphabetically I will take the first, the Alexander apple. You will understand that the numerical values, which range from 0 to 10, are under four heads, dessert, cooking, home market and foreign market. We consider the Alexander wholly worthless as a dessert apple, so that if it were exhibited with a lot of fruit for dessert purposes it would count 0. For cooking purposes we have rated it at 9. For the home market we call it 9. It is the business of this Association to endeavor to show which is the most profitable for a man to grow. Now, here is one of the lowest, the Cornish Gilly-flower. The Gilly-flower for dessert purposes is rated 1. If it were put in as a dessert apple it would be worth more than the Alexander, but for cooking purposes it is worth 0, for the home market 1, and for the foreign market 2; so its total value is only 4. If we take the Northern Spy we give it 10 under each head; so it would be worth 40. You would need to have a great many apples on the table of the Cornish Gilly-flower's qualities to compete with one only of the Northern Spy.

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*For the Report see Appendix, pp. 82-6.

KING OF TOMPKINS COUNTY.

Mr. Wilkinson.—How have you rated the King of Tompkins County ?

Mr. Beall.—The rating is under the four headings respectively, 8, 8, 10 and 10.

The Secretary.—I should be almost inclined to place that at 10 for cooking; it is one of the best.

Mr. Wilkinson.—I have always thought the King of Tompkins County one of the best that could be raised.

Mr. Dempsey.—Some feel like putting it at 10 for dessert. For my part I think 8 is high enough; when you compare the King of Tompkins with the Pomme Grise or Cox's Orange Pippin the King of Tompkins is very imperfect, and if you are going to give it 10 for cooking purposes I think it should be reduced in some other way, so that it will not count any more in the aggregate than it does now.

Mr. Wilkinson.—I think the King of Tompkins is rather inferior as a dessert apple.

The Secretary.—I move that the King of Tompkins be raised to 10 for cooking purposes.

The President.—It is moved and seconded that the King of Tompkins be raised to 10 for cooking purposes. Carried.

Mr. Dempsey.—I move that the King of Tompkins County be given 6 as a dessert apple. A perfect apple in every particular will only receive 40 points, and as it is left at present the King of Tompkins gets 38 points, and it is not worthy of it. We should reduce it as a dessert apple as much as we have raised it for cooking purposes.

The Secretary.—I agree with Mr. Dempsey: it is too high for a dessert apple at 8.

Mr. A. McD. Allan.—We considered in making this list what was the popular opinion, to some extent. We know that the King of Tompkins County in a strict ruling is not a dessert apple, but I have some doubt whether the time has yet come when we should fix the rating by the strictest rules. We have followed the popular sentiment to some extent, and hence we have given this apple a rating higher than we could in strictness.

Mr. Elliott.—I raise a good many King of Tompkins, but I know most of my boys when they go down the cellar for an apple bring up a Northern Spy. Now, the Northern Spy is only good as a dessert apple for a certain season of the year, whereas the King of Tompkins is good as soon as it is ripe.

Prof. Saunders.—I am enough of a boy myself to prefer the King of Tompkins to almost any other apple, and I hardly like to see it put as low as 6 for dessert purposes; I would rather take off somewhere else. I believe something should be taken off on account of its tendency to blow off the trees in stormy weather, but I do not like the idea of taking that much off it as a dessert apple because it would show unfairly when compared with other apples of perhaps inferior quality from your standpoint. i think the King of Tompkins County is one of the best apples that one can get to eat—one of the highest flavors. I do not object to it on account of its size, for if I cannot eat the whole of one myself I have never any difficulty in finding some person who is quite willing to take a share in it.

The SECRETARY.—It seems to me that a good way of getting rid of this difficulty would be to have a column for productiveness, and in that way we would put the King of Tompkins down 3 or 4, and out of 50, which would be the maxim, it would have only 40 or 42.

SEVERAL MEMBERS.—That is a good suggestion.

Mr. WILKINSON.—I suppose the idea of this list is to guide those who wish to plant out an orchard, that they can refer to it and pick out those that have the highest value attached.

Mr. A. McD. ALLAN.—That is not the idea of this list; there is a separate list for that. In this list we have the particulars that judges at exhibitions want. The difficulty in having a column for productiveness is this, that a great many of these apples are local, and while an apple might be very productive in one neighborhood under a certain set of circumstances, in another and under different conditions it might not be productive at all.

A MEMBER.—I do not think we need be afraid to let the King of Tompkins stand at 40.

Mr. RICE.—It has no rival; I do not think there is any danger in letting it stand 10 all through.

Mr. DEMPSEY.—What is the object of our trying to produce new fruits if we have already arrived at perfection.

The PRESIDENT.—The question is before you; shall we reduce the King of Tompkins County to 6 points as a dessert apple? Lost.

THE NORTHERN SPY.

The PRESIDNET.—The Northern Spy is now before your consideration.

Mr. BEALL.—The Committee thought it better to put the Northern Spy at four 10s.

Prof. SAUNDERS.—I would move that it be not ranked higher than the King of Tompkins County.

The SECRETARY.—I second that; it is inclined to spot sometimes in localities, and to be imperfect.

Mr. WILKINSON.—I think it is rated too high as a cooking apple; it is very insipid.

Mr. WILSON (Chatham).—It is not a good enough keeper to rank as high as 10.

Mr. ALLAN.—There are several points you are forgetting. The list is constructed upon the understanding that we have perfect specimens; and for the purpose of aiding judges when it is expected that perfect specimens are found on the exhibition table. In regard to a perfect Northern Spy, I am willing to stand by the rating given. I know that, even for the home market, the Northern Spy, for its own season, still stands at the top of the list, and in the foreign market it will do so every time. Of course we find many of them spotted, but that does not touch the question at all: we do not want these spotted apples, but perfect fruit in every instance.

The PRESIDENT.—The question is whether we shall reduce it, as has been moved and seconded. Lost.

The SECRETARY.—I am inclined to attack it on another point, that is for the foreign market. It is placed as high as the King, and certainly the King sells for higher prices in the foreign market than the Northern Spy.

Mr. A. McD. ALLAN.—There, again, as far as the market is concerned, the standard is taken on the apple itself. You will make more out of the Northern Spy than the King; its productiveness does it. You will make more out of a perfect crop of Northern Spies than out of a perfect crop of Kings. I think you will make more out of the Baldwin than the King, but it does not rank with the King.

Mr. ELLIOTT.—If a man who is a grandfather plants the Northern Spy in our part of the country his boys may get some of the fruit, but I have had some that have been planted thirteen years, and I have never got a crop yet.

Mr. Rice.—My friend here (Mr. Allan) says he can sell Baldwins quicker than the King. I had a hundred Baldwins in a fine location and I have not yet got a good crop.

The President.—This apple has been passed upon, let us take something else.

THE GREENING AND LOUISE.

A Member.—Let us have the Greening.

Mr. Beall.—We have rated that at 8 for dessert, 10 for cooking, 8 for home market and 8 for foreign market.

A Member.—What about the Princess Louise ?

Mr. Beall.—We have it 8 for dessert, 7 for cooking, 7 for home market, 8 for foreign market.

The Secretary.—I do not think it is ranked high enough as a dessert apple, neither is it ranked highly enough as a market apple for the home market, for at Christmas time it takes on such a beautiful color that I think perfect samples should stand higher than the figure given. I think it should be 10 for dessert purposes.

Mr. A. McD. Allan.—The trouble is the Princess Louise is a new variety, not usually cultivated, and I have always gone on the principle of being very suspicious of anything new. I prefer to see it tested thoroughly first. I have a very high opinion of the Princess Louise, but upon that general principle I purposely rated it lower than I would otherwise have done on account of its newness, and its not being sufficiently tested.

The President.—As it is an apple not very generally known I think it is best to leave it alone.

THE GOLDEN RUSSET.

The President.—A member calls for the Golden Russet.

President Lyon.—Which Golden Russet ? Is it the English Golden Russet ?

The Member.—I mean the English Golden Russet. I claim there is an English and an American Golden Russet, The American is a deeper Russet and a larger apple, and never gets the beautiful yellow color the English variety gets.

Mr. Dempsey.—I think we know a little about Russet apples, and I may say I have never seen an American Russet yet. What is called the American Golden Russet was originated in England by Dr. Hogg, and he called it the Russett ; there is some other name he had for it, which does not matter however. There are more than twenty varieties of the English Russet and twenty sizes.

President Lyon.—There is no such thing as the English Golden Russet described. The Golden Russet of western New York is the English Golden Russet, but the book does not recognise it as entitled io the name English, though there is an American Golden Russet entirely distinct from it. The tree is an upright grower, and very unprofitable ; here it is sometimes called the Sheep-nose. It is quite distinct from the apple we have been talking about, and I think it is very desirable we should thoroughly understand these things and understand each other.

Mr. Beall.—We may as well proceed to the question. Someone has asked the rating of the Golden Russet. The apple in question is the one that Downing simply calls the Golden Russet, but supposed to be of English origin ; we have no authority from Downing that it actually is, but he says it is supposed to be. We have it down at 7 for dessert, 8 for cooking, 7 for home market and 9 for foreign market. [Rating not objected to.]

THE STARK.

Mr. Beall.—I want to say there are three apples here that we have not on the list (referring to exhibit of apples). We have plenty of room, and shall be glad to put on any apple you may name, provided you give us the ratings here. Someone has mentioned the Stark ; we will insert that if he will give us its proper rating.

Mr. WILSON.—I called for the Stark ; I found it here on the fruit table and I think it is remarkably good. It is spoken highly of by those who grow it, but beyond that I do not know anything about it.

Mr. CLIFFORD.—I have raised the Stark from nursery stock. The trees are bearing well, and it is fully as early as the Greening in this country, or the Baldwin, and a little larger than the latter apple. One man put out an orchard from my nursery a few years ago, and he told me this fall that the packers put up five and a half barrels from one tree, and the tree had been out eleven years. The apples are not first class quality, being a little thick in the skin, but they bear handling and shipping well. They are not as high colored as the Baldwin. The tree is very thrifty to grow in the nursery. I would not rate it as a first rate dessert apple, and it is hardly sharp enough to be a really good cooking apple. For its keeping qualities and prolificness I think it would rate high.

Mr. BEALL.—Can you give us any authority that this is the true name of the apple.

Mr. CLIFFORD.—Only that it is mentioned in all nurserymen's catalogues as the Stark. I think it was originated in central New York.

President LYON.—The Stark apple originated in Ohio. It will be found described in the list of the Ohio Pomological Society, in their report. It ranks quite low, except as to its keeping qualities for the market.

Mr. BEALL.—What would you consider is the proper season of the apple.

Mr. LYON.—It is a winter apple.

Mr. A. McD. ALLAN.—My recollection of the Stark is that it was particularly coarse—a heavy, coarse grained apple, and almost flavorless.

Mr. CLIFFORD.—What time did you test it.

Mr. ALLAN.—In the fall.

Mr. CLIFFORD.—About the 1st of April is the time it becomes eatable.

THE FAMEUSE.

The PRESIDENT.—The Snow apple is called for.

Mr. BEALL.—That is one of the disputed apples—its season is disputed, We have rated it as an autumn apple. For dessert we have marked it 8 with a good many qualms of conscience, for cooking 2, for home market 9, and for foreign market 8.

A MEMBER.—I think the rating for cooking is altogether too low ; it melts right down with a little sugar.

Mr. CASTON.—I agree with that ; I think there is only one better cooker than the Snow, and that is the Duchess.

Mr. WILSON.—I move that it be raised to 9 points as a dessert apple.

Mr. WILKINSON.—As a dessert apple I think it has no superior. As a cooker it is a little inferior, but for dessert purposes I think it is entitled to the maximum rating.

Mr. BEALL.—We do not recognize the name Snow at all ; we call it the Fameuse.

Mr. WILKINSON.—Of course I referred to the Fameuse though I said the Snow.

The PRESIDENT.—It is moved that the Fameuse be raised one point as a dessert apple. Carried.

Prof. SAUNDERS.—I move that it be raised five points as a cooking apple. Carried.

THE MANN AND SPITZENBERG.

A MEMBER.—Give us the rating of the Mann apple ?

Mr. BEALL.—4 for dessert, 7 for cooking, 7 for home market and 8 for foreign market. Approved.

A MEMBER.—The Spitzenberg ?

Mr. BEALL.—9 for dessert, 9 for cooking, 9 for home market and 10 for foreign market.

Mr. ELLIOTT.—For cooking I think it is rated too high, unless it is put in the oven early in the morning and cooked all day ; then we might give it 10.

Mr. WILKINSON.—I suggest raising it for dessert to 10.

Mr. A. McD. Allan.—I have no objection to agreeing with Mr. Wilkinson. As to its qualities as a dessert apple, it deserves to be hoisted up a point; it is certainly a magnificent dessert apple.

Prof. Saunders.—I think it should stand where it is. It is a tough apple to eat; it is not a favorite with people who have not good teeth, and they have to be considered.

The President.—That is generally the fault of the grower or the person using it. When kept in a proper temperature it is all right; but it must not be kept in too dry a cellar or storage.

Mr. Dempsey.—The Spitzenberg has been largely grown in our section, but I think the last tree is now dead, and I for one am not sorry. I am surprised at any one suggesting that it be raised for dessert purposes.

The President.—Well, shall we raise it one point as a dessert apple? Lost.

SHIAWASSEE BEAUTY.

A Member.—Let us hear the rating of the Shiawassee Beauty?

Mr. Beall.—We have rated it 4 for dessert, 6 for cooking, 6 for home market and 9 for foreign market.

Prof. Saunders.—I think that is too low for dessert. I move it be raised one point as a dessert apple. Carried.

The President.—We are asked for the rating of the Yellow Transparent.

Mr. Beall.—For dessert 5, for cooking 7, for home market 4 and for foreign market 0.

Mr. Mitchell (Leamington).—I have had it three or four seasons. It is a splendid bearer and as a dessert apple cannot be beaten; I would rank it higher than the Early Harvest. It does not spot, and is very even in size.

Mr. Wilson (Chatham).—People have been misled as to the time of its ripening. I find throughout the country that it does not ripen nearly so early as is represented, and it is not a very early apple at all.

Mr. Mitchell (Leamington).—It will stay much longer on the tree than any other.

The Secretary.—How soon can you use it?

Mr. Mitchell.—Much the same as the Early Harvest, perhaps a few days later, but it gets better in quality as it remains on the tree. So far as I am acquainted with it it is superior to the Summer Harvest. It does not spot, and it is very uniform in size.

The President.—It has been moved and seconded that this apple be raised to 6 for dessert purposes? Carried.

SALOME.

The President.—Can you give a rating for the Salome?

Mr. Caston.—I think it is new in this Province.

President Lyon.—In 1884, at the meeting of the Mississippi Valley Society at New Orleans, it was shown for the first time by a gentleman who originated it, or at least was introducing it in westrn Illinois. It was specially hardy and very promising for that reason, but only third or fourth rate in quality, and not particularly attractive either in appearance or size. It is a little below medium size. I do not think it has taken very strong hold upon the west. It does not reach into northern Iowa or Wisconsin at all, and I do not think that for Michigan or Ontario it would be well adapted.

Mr. Wilson.—I know it would not stand the northern climate at all.

GRIMES' GOLDEN.

The President.—The rating for Grimes' Golden is called for.

Mr. Beall.—For dessert 9, for cooking 2, for home market 5, and for foreign market 7.

Prof. **SAUNDERS**.—I would like to see it raised a little for the home market as I think it is one of the finest apples for dessert. I move that it be raised at least one point for the home market, and I shall be very glad if anyone will tell me just now where I can get some.

Mr. A. McD. **ALLAN**.—I am willing to acquiesce in that, but it is difficult under other than exceptional circumstances to get a demand for it. There is no demand for it in the home or foreign market. I have tried it both here, in Britain and in the States. I got the best prices for it in New York, but it had been pretty well written up there at the time. I afterwards shipped some there and got very little for them.

Mr. **DEMPSEY**.—It is an apple that looks so much like a young seedling in every way that unless a person knows it he will not buy; but anyone who knows the apple will pay the highest price for it as a dessert apple. I think we have no better, but for the home market or foreign market it is certainly not sufficiently attractive to the eye.

Prof. **SAUNDERS**.—I think that is a reason why the committee should adopt my suggestion; it is our duty to show that we appreciate a really good apple, despite its ill looks.

Mr. **BUCKE**.—The reason it is so low is that its color is very much against it. You cannot tell Grimes' Golden in a barrel until it gets ripe, and gets its color.

President **LYON**.—It is one of those very rare varieties that grow down as far as Virginia, and yet it seems to hold its full quality with us, and even farther north than here.

Mr. **ELLIOTT**.—Here it colors up nicely on the tree—it does with me—a rich, golden yellow. I have shown it under two or three heads, and it has almost always taken a prize.

RED CANADA.

A **MEMBER**.—Give us the rating of Red Canada?

Mr. **BEALL**.—It is 2 for dessert, 6 for cooking, 7 for home market, and 8 for foreign market.

Mr. **ELLIOTT**.—It is superior to Ben Davis and I would recommend that it be raised to 6 for a dessert apple. Motion carried.

President **LYON**.—The Red Canada often passes for a Baldwin, but among buyers it is sometimes rated much higher as a dessert apple than as a culinary fruit. It is considerably sought after, and sold in the same market for much higher prices than the Baldwin, which is our next popular apple.

Mr. **WIGLE** (Kingsville).—We find it far ahead of the Baldwin.

Mr. **WILSON**.—I find the exporters are snapping at all the red apples they do not know the name of, and any apple they do not know the name of and which is red in color, they name "Canada Red." I do not think we can judge by the way it sells in the market whether it is a good apple or not.

BEN DAVIS.

A **MEMBER**.—What is the rating of Ben Davis?

Mr. **BEALL**.—3 for dessert, 1 for cooking, 8 for home market and 9 for foreign market.

The **SECRETARY**.—1 is enough for dessert, is it not?

Mr. **WILSON**.—I move that Ben Davis be rated 0 for dessert, 1 for cooking, and 9 for foreign market.

Mr. **DEMPSEY**.—Anything that is worth growing at all is worth growing well, and when we talk about the home market or the foreign market we mean, What is going to give us the most money? Now, I can make more money out of one tree of Ben Davis than I can off fifty trees of King of Tompkins County. We have a lot of trees of King of Tompkins County twelve years planted, and we have never realised twelve barrels off them, and we have got as much as twelve barrels off a single tree of Ben Davis. When we look at the quotations in the English market we find that Ben Davis is sold as high as 32 shillings per barrel.

Mr. ELLIOTT.—No doubt Ben Davis sells well, but I think a man who charges his neighbor two dollars for a barrel of them robs him of $1.75. It is a good apple for hotel keepers; a barrel of Ben Davis will last a first class hotel as a dessert apple about three months, whereas a really good variety would not last a week. If you send a boy into the cellar to get an apple to eat he never brings up a Ben Davis, and if your wife goes down for the purpose of putting you in a good humor by making an apple dumpling she does not take Ben Davis.

Mr. A. McD. ALLAN.—I quite agree with all that has been said. Although good prices are now paid in England for Ben Davis, the consumers in England when better acquainted with it will not pay the prices that have been realised for it; it is going to come down in value, and that, too, before very long. The fact of the matter is that they are seeing into the qualities of apples quicker in that market than are the consumers in our own markets. The Baldwin, for instance, is coming down, and at the same time the Rhode Island Greening is coming up to its proper place. Ben Davis is bound to go down.

A MEMBER.—I think it should be lowered for the home market. We cast a reflection upon the judgment of the consumers when we say this apple is worth only 1 for dessert, 1 for cooking, and yet that it is worth 8 for the home market, the consumers of this country. I think you must lower it for the home market.

Mr. ALLAN.—Why should we, as long as the consumers are willing to pay the price?

Mr. CASTON (Craighurst).—I think it ought to go up a point for cooking; in our section it is not as bad as some people here make it out to be.

The SECRETARY.—Do you flavor it with lemons? (Laughter).

Mr. CASTON.—No, nothing but sugar.

No change made for home market; motion carried.

BEST SELECTION OF APPLES FOR THE COUNTY OF ESSEX.

The President announced that Mr. ALANSON ELLIOTT, President of the South Essex Farmers' Institute, would read a paper on the subject of the best selection of apples for the county of Essex—three summer, three fall, and six winter varieties.

Mr. ELLIOTT.—There seems to be some misunderstanding; I have no paper to read on this subject, though in a meeting of this description I do like to do a little skirmishing. You are now, gentlemen, in one of the most wonderful counties of the Dominion, and anything that would not suit us here would surely not suit people in distant parts. I would not form any judgment as to the three best summer apples, because I do not think we have any good summer apple at all. Take the Early Harvest, for instance. It used to be a good apple, but it is now a failure; it is very rarely you see a good specimen of the Early Harvest nowadays. Then as to the Red Astrachan; I have never bought any of them myself, but judging by what I hear from those who have had experience with it, it is not valuable. As to the Duchess of Oldenburg, I take no stock in it. We have never had a market for summer apples. I do not know anything of the Gravenstein or Benoni; in fact I do not know anything about summer or fall apples.

The PRESIDENT.—What about winter apples?

Mr. ELLIOTT.—I know the Baldwin is a good apple after our trees come into bearing, and we can better afford to raise the Baldwin for a dollar a barrel than we can the King for two dollars a barrel. Then I put the Greening as another.

The PRESIDENT.—What is the third?

Mr. ELLIOTT.—Well, I left home with the impression that I liked the Mann apple.

The PRESIDENT.—Would you put that as one of the six best?

Mr. ELLIOTT.—Yes, if you make it six I will. Then I think a good deal of the Stark; I think it is the coming apple. I would put that as one of the six. I cannot speak from experience of the Spy, neither would I advise anyone to raise the King; there is not much money in it, it is not a good yielder, but the great trouble with it is that the apples fall. The Canada Red is a good apple and a good yielder, and I put it as one of my six. There is another apple that I have not heard mentioned here to-day, Peck's Pleasant, which is a good bearer and a good apple. I think there is more money in Baldwins and Greenings than in any other apples we raise. We have a dozen different kinds of Russets; but I would not advise anyone here to grow Russetts, as they become deformed. The Spitzenberg used to be a good apple some years ago, but this fall a gentleman asked me to get him a barrel, and I could not get a barrel of good ones in the whole county of Essex. The Talman Sweet is a good apple ; it is not an extra fine dessert apple, but I never saw its equal as a baking apple. The Northern Spy is a good apple, but I think it is less suited to our light soil than to a heavier land. I am a great admirer of the Fall Pippin, but there is not much money made in growing it. Seek-no-further bears very well with us. St. Lawrence is a good apple when it is ripe, but you want to get there the night before or it will be rotten next morning. The Ribston Pippin, though a good apple, is not an extra bearer with us, and the Fall Pippin is a shy bearer. The Duchess is I think a kind of first cousin to the St. Lawrence. It is a good cooking apple before it gets ripe. Another very good fall apple, that will stand shipping, is the Sherwood ; it is a long striped apple, and is an extra apple to yield with us. Then there is the Maiden's Blush, we get about as perfect apples off it as from any tree that grows.

THE QUESTION DRAWER.

The following questions were discussed from the Question Drawer :

SHOULD EXHIBITORS OF FRUIT BE THE OWNERS OF IT ?

Q.—Should fruit exhibited be the *bona fide* property of the exhibitor ?

The PRESIDENT.—I do not think anyone here will say otherwise.

President LYON.—We have for several years in Michigan given premiums for collections of fruit which may be gathered within a certain district, not exacting rigidly that they shall be of the exhibitor's own growth, but it is only in the case of those collections that exhibitors are allowed to cull from others. I think this plan has added greatly to the interest of the exhibition, because it shows the capabilities of the district from within which the fruit is drawn.

The PRESIDENT.—Are your people in Michigan all perfectly honest ? We have a similar plan here in some of our fairs, and I have heard it more than hinted that when these people are making their collections of fruit they, at the same time, get a little to be exhibited as of their own growth.

President LYON.—We endeavor to draw the line very rigidly, and if any complaint is made it is always examined closely by the proper authorities.

The PRESIDENT —I have heard it said that the man who won the medal at the last Toronto Exhibition collected almost all his exhibit, and raised only a very small proportion. I know that it is done in local fairs right along, and I think it is a very unfair thing and one with which this Society ought to deal if possible.

Mr. WILKINSON.—I have been connected with fairs in this district for thirty or forty years, and have filled almost every office, and I do not think it is fair to allow any but *bona fide* producers. There have actually been cases where a *bona fide* exhibitor has been beaten by fruit of his own growth exhibited by some one who has collected fruit to show. The only excuse is that a finer display may be made by getting together a fine collection.

The SECRETARY.—The only thing that can be done to remedy it that I can see is to pass a resolution in this way, that in the opinion of this Association every exhibitor of fruits at any fairs should be required to sign a written certificate that the fruit he exhibits is of his own growth, and that there should be some forfeit in case it is shown that such exhibit is not as represented.

Mr. WILKINSON.—That he should forfeit all prizes, and be debarred from again exhibiting for two years.

Mr. Dempsey.—I think the best and only way to meet that difficulty, which is a very serious one, is for all honest exhibitors to keep their fruit at home. I gave notice to a couple of our Associations this year that, though I won prizes liberally, I would not take the trouble to pick my fruit and place it on exhibition against persons whom I know did not grow the fruit shown by them.

Mr. Morton (Wingham).—Our rule is that fruit shall be the property of the exhibitor, grown upon his farm or holding; and I think we have a rule that any exhibitor may be required to make a statutory declaration to that effect. Of course if a man comes along and makes a false declaration we cannot stop him, though he would, of course, make himself liable to the penalty for perjury. I think we have only had occasion to demand that declaration two or three times. Twice we stopped the man, and in the third case the declaration was taken, and I do not doubt the man's claim was *bona fide*, and that our suspicions were unfounded.

Mr. Wilkinson.—I quite agree with that; our rules are somewhat similar.

The Secretary.—Mr. President, I have a motion to make with reference to this matter. It appears to me that it would be better that all exhibitors should sign a declaration or certificate, because if you only ask one whom you suspect, you feel rather delicate about it, it being as much as to say that you suspect him of being dishonest. But if you require all to sign such a declaration it becomes a matter of course, and I think if the rule were generally known that very few exhibitors would seek to evade it. I, therefore, move this resolution, which is seconded by Professor Saunders:

> That in the opinion of this Association exhibitors of fruit at fairs should be required to sign a certificate that the fruit shown is of their own growth, and that in case of any trickery being proved, forfeiture of prizes is to follow.

Mr. Morton.—The difficulty is that you cannot make a certificate of that kind that will hold water, because, if he makes a false declaration, it is only punishable if false with regard to the facts, and the declaration must be made after the exhibit is made.

Professor Saunders.—I think in the usual form of certificate the exhibitor declares that the article shown is of his own production, growth or manufacture, and it seems to me that it is not sufficiently definite for fruit exhibitors. I think the certificate for fruit exhibitors should be so worded that there would be no evading it. Let the forfeiture be clearly shown that would follow any infraction of the rule, and I think it would have some effect. People get behind that general certificate and say they did not understand it. It should be made so clear that there can be no misunderstanding it, and if the directors then do their duty and withhold the prizes in any case where complaint is made or suspicion exists, until full inquiry is made and sufficient evidence brought forward, I think it would help very much in regulating the matter.

Mr. A. McD. Allan.—I have often judged fruit at fairs when I knew that the fruit of certain exhibitors was not of their own growth, but then I had nothing to do with that. As has been said here, one thing that is to a great extent responsible for this trouble is the practice of offering prizes for large collections. It does not pay any one grower to grow thirty or forty varieties, and I think ten or a dozen would be quite sufficient for almost any section where apples are grown. Where it is desired to have large collections shown at fairs, I think they should be collected by the Society, but I would not allow any individual to exhibit them or receive a prize for such a collection. The fact of the matter is that the offer of such a prize is a strong inducement for some man to go and steal the fruit.

Mr. Bucke. This may be all very well at local fairs, but how can you find out who grew the fruit at Toronto Exhibition, or some of the other larger exhibitions? You cannot follow it up—it is impossible.

Mr. Caston.—I think any man who is perfectly honest in making his exhibit need not be backward in making the required affidavit, and will not object to it at all. There is one difficulty in regard to fairs at which it is a rule, if you suspect a man of not being honest in his exhibit that you must protest, depositing a dollar at the time of making the protest. Then, if you fail to prove the allegation you forfeit the dollar. It is not exactly the loss of the dollar, but you get into bad odor if you make a complaint which turns out to be unfounded, though there may have been suspicious circumstances justifying the protest. I have known very bad feeling to be engendered in some cases of this kind. Now, if everyone was required to make the affidavit, it would get over that difficulty better than anything else, I think.

Mr. Elliott.—None of these certificates or declarations will do any good unless the persons who are aware that crooked practices are going on will make that fact known, and they will not do it. At a fair at which I was a judge recently a man said to me, "I want to see which of the Ben Davis' got the prize." I showed him the ones, and he said, "Why, he (meaning the exhibitor) got that out of my orchard." Now, if men like that would tell the secretary and put in a protest, that kind o' thing would soon disappear. If people will stand by silently and see prizes carried off by fruit which they know well the exhibitor has never grown, all the declarations and affidavits will not do any good.

The Secretary.—I think we could have a printed form of affidavit to be taken by every exhibitor, as Mr. Caston says, and, in case of any trickery being shown, forfeiture of the prizes won at the exhibition should follow.

The motion was then put and carried.

ADDRESSES AT THE EVENING SESSION.

At the opening of the evening session the President announced that there were a number of local gentlemen, and gentlemen from the American side in the hall upon whom he would call for short addresses. He then called upon the Mayor of Windsor.

WELCOME TO WINDSOR.

Mayor Twomey, who was received with applause, expressed the great satisfaction he felt in seeing the officers and so many members of the Association in the town of Windsor, and he was also much gratified by the presence of the gentlemen from Michigan. To all of them, on behalf of the citizens of Windsor, he had much pleasure in extending a most hearty welcome to that town and the county of Essex, where the importance of the aims and work of the Fruit Growers' Association were well known and appreciated. He had always regarded the county of Essex as the garden of the Dominion, and he felt sure the chairman knew well the many advantages that county enjoyed as a centre of fruit cultivation. Still, he believed the fruit industry was but in its infancy at present, and had no doubt that a great stimulus would be imparted to it by the visit of the Association, which he hoped to see repeated at no very distant date.

The President replied fittingly to the Mayor's remarks, and then called upon President Lyon, of the Michigan Horticultural Society, for a few remarks.

FRUIT GROWING IN MICHIGAN.

Mr. Lyon said, speaking for the Michigan Horticultural Society, that they were trying to do their part in elevating horticultural and pomological interests in the State of Michigan. Pomology was occupying the attention of a great many in that state, in the eastern part more especially, while in western Michigan peach growing was becoming a leading industry. Their society had existed since 1870, and they felt that its existence had been the cause of improvement and advancement in fruit culture generally, and that they had been instrumental in bringing order out of confusion. He then described the manner in which it had become necessary to have local societies to ascertain the fruits suitable to be grown within limited districts, instead of having a general list of American fruits, some of which, though grown successfully in one part, were quite unsuitable for others. This dividing up into smaller districts had been going on since 1848, when an assembly of fruit growers had met in Buffalo to prepare a fruit list for the United States. Although this was a Canadian Association, he felt that the members of all Fruit Growers' Associations were brothers in a great and good work, and he hoped they would always work together harmoniously for the promotion of the common weal.

Mr. TAYLOR, of Michigan, was then called upon by the President. He said that the predominating interest among the fruit growers of western Michigan at the present time was peach culture, though grapes, pears and small fruit were grown to some extent. The district from which he came was about six miles wide and forty miles long. In every part of the state, where the prospect seemed at all hopeful, peach orchards were being planted, but, in the district he had referred to, peach culture was almost the staple occupation, the peach orchards being almost continuous from farm to farm for long stretches. When the trees were in bloom the sight was a most beautiful and inspiring one. The crop during the summer of 1889 had been the smallest they had had since 1875, but some years the crop was larger than they had railway facilities for getting to a market in time to realise upon them. At the nearest lake port to this district, where steamers for Chicago and Milwaukee called, it had been the regular thing a year ago to load three boats each evening for those markets, each boat carrying from five to fifteen thousand baskets. Two miles south two other vessels were loaded, and ten miles east ten or fifteen cars per day. On one day, when the wind was so boisterous as to prevent the boats sailing, he had driven to the railway at 4 o'clock in the afternoon, and before reaching it he found teams strung out for half a mile on the highway, waiting their turn to load fruit on the cars. These facts would give some idea of the quantity of fruit grown in that district. Their earliest peaches ripened about the middle of July, and shipments began about that time, increasing until about the middle of August, when shipments became very heavy, and continuing so until about the 15th of October. The speaker concluded his remarks by expressing his pleasure at meeting with his Canadian brethren, and his conviction that by united efforts much would be accomplished for fruit culture both here and in his own country.

VINE CULTURE AND WINE MAKING IN ESSEX.

After the audience had been favored with a piano solo by Miss Werrett, the President called upon Mr. Solomon White, of Windsor.

Mr. WHITE said he desired to endorse everything that had been said by the worthy Mayor of Windsor in welcoming the members of the Association to the town of Windsor and county of Essex; he only regretted that their visit had not been made at a time when they could have had ocular demonstration by a visit to some of their orchards, full of trees loaded down with delicious fruit, of the capacity of Eseex as a fruit producing county. He himself had done something in fruit growing, principally in vine culture and wine making, and he might say that he had to-day in his cellar wines made almost twenty years ago, and yet sound and good. The great secret of making wine that would keep was to bring the fruit to what would be called its normal condition. The grapes grown in the county of Essex were to a large extent normal; but where he had had experience elsewhere, near Toronto, they were not, and required the addition of a little sugar and water to bring them to that condition. These were facts he had learned long ago, and since then he had succeeded pretty well. Some ministers were very anxious for a non-fermented wine, but he really did not know where they would find it, for it must ferment until the alcohol was all converted and all foreign matter thrown out and done away with. When the normal condition of which he had spoken of was reached, the wine, if strong enough, would keep. Vine culture and wine making was a great industry in the county, and though the number engaged in it was constantly increasing, the demand was greater than they were able to meet. He would recommend them to go and see his old friend Major Wagstaff, who had some as fine wine in his cellar as could be found, and who could show them what was to be made in the county. Coming to apples, he claimed for the county of Essex that in it could be raised the finest apples to be found anywhere, and especially along the lake shore. He felt great pleasure in being present at these meetings, where so much could be learned useful to the fruit grower, and he trusted the present visit of the Association to the town of Windsor would not be its last, but that they might on some future occasion return at a time when they could be shown to more advantage the beauties of the county.

HORTICULTURE IN THE PUBLIC SCHOOLS.

Mr. C. W. **Garfield**, of Grand Rapids, Michigan, was then called upon, and after making a few remarks on the similarity of fruit growing conditions in Michigan and western Ontario, and of the feeling of brotherly love which should exist between the Michigan horticulturists and those of Ontario, expressed his desire to say a few words on the subject of horticulture in the public schools, for if he felt more earnestly on any one subject than another it was upon the question how the younger portion of the community should be instructed and encouraged in horticulture. The only way he could see of doing this was by enlisting the sympathies of the teachers. It was not often that children could be got together in such a meeting as the present one, but it was possible to form little coteries in which a number of neighbors, their wives and children, might get together and discuss such questions, and thus instil an interest in the subject into them. They wanted to bring to this some of the enthusiasm which carried them along in their horticultural life. He felt great pleasure in joining in discussions on horticultural subjects, not only those connected with the question of how much money could be got out of it, but those which related to horticulture in its highest and best form.

Mr. A. **McNeill**, science master of the Windsor high school, followed. He said he was heartily in accord with the previous speaker, who had said very truly that it was not possible for a public school teacher who himself knew nothing of horticulture to impart an interest in it to the children under his charge. He had been a senior teacher for some years, and he was sorry to have to say that he knew very few of his fellow teachers who were at all interested in that line. In his own botany classes he had found no difficulty in getting up an interest in the subject; he found that he could interest his pupils from one end of the session to the other; the interest they showed was really surprising. He referred to the difficulty of getting young people now-a-days to stick to the farm, and said he had no doubt that as soon as intelligence could be brought to bear upon farm life there would be no more difficulty in that respect; the young people flocked to other callings because more intelligence was apparently called for in them, and so, when by the application of intelligence agricultural and horticultural pursuits assumed their proper dignity, young people would flock to them, instead of deserting them for other occupations.

After a duet by Messrs. Pepper and McLaughlin had been sung, Mr. Edwin Reid, Secretary of the Michigan Horticultural Society, was called upon.

Mr. **Reid**, while acknowledging the honor of being asked to address the meeting, said he did not think it necessary for him to add anything to what had been said by his fellow-countrymen, President Lyon and Mr. Garfield.

PROF. SAUNDERS ON HORTICULTURE.

The **President** then called upon Prof. Saunders, of the Dominion Experimental Farm, Ottawa.

Prof. **Saunders**.—I am highly delighted this evening to meet with our friends from the other side, and I am sure their visit will do both them and us good. I have had personal experience of the very hospitable manner in which they are in the habit of treating Canadians, and I trust they will carry away as favorable impressions of us as I and others, who have been fortunate enough to spend a short time among them, did of their kindness. I must next congratulate the people of this district and the county of Essex on the splendid country they possess, of which I believe the half has not yet been told. About fifteen years ago, when a director of the Fruit Growers' Association, I with three others was deputed to inspect and report upon the character of the lake shore district from St. Thomas to Amherstburg. We started out with the expectation that we would be able to complete the task in two or three days, and we had vehicles to take us along, but we found so much to interest us that our time was consumed before we reached Chatham. We found so many evidences of the advantages of the district for the growth not only of apples, pears and plums, but also of peaches, that the committee were quite astonished and reported most favorably of the district, hoping the next year to take up the remainder of the district, including this, your favorite county. I believe, however, that this was not done, and the work has never been completed. I make the suggestion, and think it would not be a bad idea, for the Association to send a deputation up here, to report upon the advantages possessed by this district for the growth of the finer fruits. I am sure they can be produced here in great abundance. In connection with my duties as director of the Experimental Farm, it is my business to travel from Halifax to Vancouver, and I try to find out all I can about that little stretch of country—only about four thousand miles! But it takes some time to get over it and get acquainted with it and the differences of climate, soil and other characteristics connected with it. I have seen and examined the most favored districts of British Columbia, and some of them are certainly very promising for fruit growing; but I am free to say that I am not acquainted with any part of the Dominion in which fruit-growing can be carried on with greater promise of success than in the county of Essex. The display we have upon the table before us, most of which, I understand, comes from this vicinity, and has been produced here, should be sufficient to satisfy anyone that it is indeed a great fruit district which can grow such apples as these, keeping until this time in such condition as we see them. I would advise you, one and all, to cultivate more fruit; and I may say here that I believe in the aesthetic aspect of the question which has been advanced by my friend Mr. Garfield. You will seldom find a man actively and enthusiastically engaged in any department of horticulture who is a bad man. I suppose I ought to say something to you about the present and future of experimental farm work, as it bears upon fruit culture in Canada. In the organization of the work of the Experimental Farm, as the name implies, all departments of agriculture are expected to be covered; everything, in fact, with which a farmer is concerned—corn growing, stock raising and all the other important features of farm work. Such experimental work, taken up from time to time, will be most beneficial to the provinces in which these farms are situated. That is all I propose saying about the farm work generally. But in the department of horticulture I must say a few words more, as there are many very important aspects of this work to be considered, when we take into account the population of the Dominion and its needs. I firmly believe that it is the best policy and the only practical solution of some existing difficulties, that in districts like this, which are very favorably situated for fruit growing, it should be gone into on a large scale. I am equally as strong in my belief of the importance of having fruit at every man's door if it is possible to have it, in every part of this Dominion, but while there are few sections of the country where small fruits, such as strawberries, raspberries, gooseberries and currants cannot be grown, there are very many indeed where a beautiful apple, pear, plum, or peach, such as you can grow in Essex, cannot be grown at all; where the trees will not endure the severity of the climate. Either the cold of winter or the drouth of summer is sure to destroy them. The work of the Experimental Farm is to introduce from other countries having similar climates, and to originate in our own country varieties specially adapted to those districts not so favorably situated as yours is, so that we may eventually be able to produce apples, pears and plums which will prove hardy even in the most rigorous climates. We have in the Dominion to furnish to the settler the varieties he can grow to advantage, and if they are not up to the first quality, I know they will appreciate in the districts I have spoken of even second and third class, if they can grow them. In connection with the Experimental Farm work, a farm has been selected in Nova Scotia, at a village called Napan, where, though there are good facilities for fruit growing, the people have not paid much attention to it; partly, as they will tell you if you ask them, that they can buy apples grown in the famous Annapolis Valley cheaper than they can grow them. They are beginning, however, to realise that it is better to grow fruit themselves, and orchards are being planted by them now, owing’ more or less, to the advice and example given them by us, which served as an interesting object lesson to them. I have no doubt that fruit growing will become very general there within the next ten or twelve years. In the North-west one farm is located in one of the great wheat belts of Manitoba, and the other on the verge of the prairie district in the territory, where the climate is a continuation of the great American desert, and the rainfall is lacking which they get further east, in Manitoba. In those districts we are endeavoring to test such varieties as can be obtained in Russia, Silesia and different other European countries—the apples, pears and plums that are found to grow in similar districts there. We are also trying to get from our neighbors in Minnesota such fruits as they have adapted to the North-west. I have no doubt that in a few years we shall be able to establish a degree of reciprocity with them in that line, whether a reciprocity treaty be negotiated or not. I made an attempt in that direction recently, when in Washington, and succeeded so well that the Secretary there has placed us on the list of Experimental Stations which receive samples of the seeds and products the United States receives from abroad, and we shall send them any we may introduce as soon as we possibly can. I think this reciprocal interchange among our fruit growers and those of the United States will do good, and our neighbors across the line are so good-natured that it is pleasant to get among them to negotiate with them these little trifles of bargains. Of course we generally try to get a little the better of them ; it would not do for us to lose the reputation we have gained in that respect. The United States have done a great deal in this direction, in the introduction of new trees from Russia for testing in the colder climates of this continent, and none of them so much as Iowa. Professor Budd has been associated with our own Mr. Gibb, of Abbotsford, P.Q. They travelled together through Russia, and secured and introduced into this country many new varieties of fruits, giving promise of being adapted to the requirements and climate of the country. A few weeks ago, while at Indian Head, I went very carefully over the Russian apples sent up a year ago last spring, which have stood two summers and one winter, and I must say the success attending their growth was very gratifying, although the season has been unusually trying, the rainfall being little more than five inches between April and September, and the trees manifested a degree of hardihood and vigor that I think augurs well for the future. Not only apples, but some cherries also, promised very well ; and through the energy of our excellent secretary, we are now on the eve of getting from another part of Russia a consignment of trees of a very promising sort, which I trust will prove another very valuable addition to the list we are trying to grow at the present time. Apart from these introductions we are trying to originate new fruit. I will give you one experiment now in progress, from which you will have an idea of the work we are trying to do in this respect. The town of Riga, in Russia, is, I suppose, about a thousand miles north of the latitude of Winnipeg, and around that district a great many varieties of fruit are grown, and even north of that in Russia, where the climate is very cold, and they have dry winds something like those in our own prairie district. Through the kindness of a seedsman in that town I have been able to secure a considerable quantity of seed of apples, pears and cherries which have been ripened and sold in the markets in towns north of that place. From these seeds—I think I am within the mark—fifteen hundred trees have been grown ; seedling trees, which will be planted out in orchards in Ottawa and at the North-west farm, and it is expected that by thus multiplying the chances of success almost *ad libitum*, we shall, in a very short time, get some varieties to manifest that degree of hardiness to make them meet the great want of our people all over the country. In addition to growing seedlings in the way I have outlined, we are endeavoring, by cross-fertilization with the hardiest fruits we have, to produce new varieties. You must not think all our labors are devoted to the interests of the North-west, or the colder sections of the country however. We are endeavoring to help the dwellers in such situations as yours in Essex, and other favored parts of the country, by introducing and testing new varieties as they come out. We hope by testing these new varieties, some of which are so highly lauded and little deserving of it, to be able to save many a farmer a very large expenditure, to which he has been hitherto subject, in having to test these things for himself. These new varieties will be tested once for all in an authoritative manner, and their value determined in such a way as to inspire confidence among the fruit growers of this country. And a great saving of both time and money may be thus effected, while actually useful varieties will be placed before the fruit growers in a way which could not be done under any other system. I am very glad to be present with you here, and to have had an opportunity of making these few remarks, with which I hope I have not occupied too much of your time.

ESSEX AS A FRUIT-GROWING COUNTY.

After the audience had been favored by a solo given by Mr. Patterson, of Windsor, the Chairman called upon Mr. Cleary, of Windsor.

Mr. CLEARY expressed his thanks for the compliment paid him in being asked to speak at the meeting, and said it afforded him great satisfaction that the meeting of the Fruit Growers' Association should have been held in Essex, as he felt it would be of great benefit to the county, by drawing attention to its advantages as a fruit-growing and agricultural section of the Dominion. It was situated, he said, very similarly to the State of Michigan, and the climate was most favorable for the cultivation of fruit. The county was situated in about the same latitude as Spain, and it would perhaps surprise some of his hearers to learn that in it could be grown fruit which could not be grown elsewhere in Canada. He had seen Catawba grapes growing on Pelee Island on the 15th of October, and in some parts of the county sweet potatoes could be grown. If this meeting of the fruit growers resulted in drawing attention to the county, it would be productive of much benefit, for although the area of the county of Essex was about 430,000 acres, only about one-third of it was cleared and in cultivation, and of that area about one-quarter was devoted to the cultivation of corn, which, in Essex and Kent, could be grown with as much success as in the Western States. He was happy to be able to bear testimony to the truth of what Mr. Solomon White had said regarding the wine in his cellar. Longfellow had said of Catawba wine:

> For richest and best
> Is the wine of the West
> That grows by the Beautiful River,
> Whose sweet perfume
> Fills all the room
> With a benison on the giver.

EVAPORATED FRUIT—GROWTH AND IMPORTANCE OF THE INDUSTRY.

Mr. L. B. RICE, of Port Huron, Mich., read the following paper on this subject:

In presenting the subject in question to this society to-night, I would refer briefly to the history, growth and importance of this enterprise, for, like all other great enterprises, it has had its small beginning and its infant days. It is true that the ancient inhabitants of the desert regions of Asia and Africa dried and pressed the farinaceous fruits of the date, palm and the prune, and that these formed largely the food used on their long journeys across the arid sands. But I have not gone back to their means of drying and pressing the fruit; nor have I traced the method by which the aborigines of this country prepared their berries, so that they would keep even when buried under the ground. I have commenced with my personal recollections of fruit evaporating in my own home. My recollections commence in the typical log house of western New York, with its broad fireplace and stick chimney, situated on the old Ridge road in the town of Sodus. Every evening during the autumn, father, mother, brothers and the hired help gathered in a wide circle around the great fireplace, to pare apples or peaches for drying, with which to assist in buying our winter's clothing. The apples were pared by hand, cut into quarters and the core cut out in the most artistic style. The quarters were then put on strings. Some of the neighbors bought wrapping twine from the store, but my mother would take the tow that was left when she spun her flax for our summer clothing, re-card it and spin it into nice strong twine for that purpose. I remember well that a great wooden bowl was placed on the table and the quarters thrown into it as they were prepared. Around this bowl two or three of us were gathered, with our needles and strings, to string the apples. These strings of apples were hung on racks on either side of the fireplace and on the edge of the mantel-shelf; they were also suspended from the chamber floor joist on the sunny side of the house outdoors, and in every place where they could be dried. The first improvement came in using scaffold boards to spread them on. We got out some logs in the winter and took them to the saw-mill, had them cut on shenes, and used the boards to build and cover the scaffolding. Everything was extemporized for use—even the more flat roofs of houses, sheds, barns, etc.—wherever the fruit could get the sun. But if there should come on a few days of wet weather, there was trouble and loss. We had to go back to the use of strings. Racks were made of strips of lath and put over the stove, under it and all around. From this the transition was easy to a small room set apart for the purpose. A stove was placed in it and racks covered with apples placed above, below and on all sides. But there was the danger of having a hot fire maintained in the house, and several buildings were burned. To avoid this trouble a small house was put up away from the farm buildings, and a stove placed in it, and it was christened a "dry-house."

While all of these improvements were being made in the art of drying the fruit the spirit of invention was advancing in other lines as well. Some ingenious person conceived the idea of paring the apples with a machine. We could not see how it could be done, but he accomplished the task. It was in this manner: A fork with two prongs was forged in one end of a small rod of iron, and the other end was bent into a crank. Two upright standards were placed at one end of a board 2½ to 3 feet long, and this was fastened to the top of them by means of staples driven in, thus forming the bearings on which it was to turn. To use this machine the operator would place the free end of the board on a chair or bench, then, sitting on it, he would turn the crank with his right hand, holding the knife in his left. The knife was made of a thin piece of steel, bent at the ends and driven into a piece of wood, being raised just enough to represent the thickness of the paring. With this a good, spry young man could pare a bushel of good-sized smooth apples in an hour. These were the glorious days of "paring bees." The lucky young man who owned one of these machines was sure of an invitation to all of the bees in the neighborhood; more than that, he was sure of two of the smartest girls to slice his apples, and a big piece of pumpkin pie at 10 o'clock, and in some instances, a half hour's frolic. But the restless Yankee spirit could not stop at this. His inventitive genius, so thoroughly aroused, and starting out under such favorable auspices in the great fruit belt of western New York, has never slumbered. There soon appeared a paring machine with large and small wooden wheels and a belt, so that increased speed could be given to the motion of the apple, and this was followed by the first cast iron geared machines.

Some time in 1857, I think it was, one Mr. Mason brought out a little portable dry house. I say "dry house," for we had not yet risen to the dignity of the name "evaporator." Mason's dry house met the wants of the small producer better than anything else ever given to the public, and thousands of them are still in use, giving good satisfaction. The building was 4 feet 6 inches by 7 feet on the ground and 7 feet high to the eaves. The heater was a sheet iron cylinder about 6 feet long, with cast iron heads, in one of which was a door and draft, while the other was solid. The door was flush with one end of the building, so that the wood was put in from the outside. The stovepipe came out on each side near the back end, and returned to the front, where it was joined into one and came out just above the door. This accommodated 10 or 12 trays, 3 feet by 4 feet, and would dry as many bushels in a day. Its capacity is increased by building larger and increasing the diameter and length of the cylinder heater. All of the principles of the tower and hot air draft were and are used in this, as it depends for success on free admittance of air at the bottom, and good ventilation at the top. The patent has expired long ago, and any person can use it freely. With wooden slats for trays, the cost complete is about $20. While speaking of small evaporators, there is another very much in favor among the next class of produces. It consists of two brick walls about 3 feet 6 inches or 4 feet apart, and sheet iron so placed in as to carry the draft backwards and forwards from one end to the other, and trays put in between. A $75 Canton furnace is used, the whole costing about $200 aside from the building, which is large enough to have the work done in it.

The first to build on a large scale was Alden. He used a tower 4 feet square on the inside, and running from the basement through and out of the top of a two story house. Steam radiators were used, being placed at the bottom of the tower; but these failed to give satisfaction, and were replaced by hot air furnaces. The apples were put on 30 to 40 trays, one above the other, the fresh being introduced at the top and gradually lowered to the floor of the first story, where the dry ones were taken out. This seemed to be the most philosophical method, but it was found that the fruit was scorched when brought near to the fire, and the process was reversed. The green fruit was put in nearest the furnace and gradually raised, the dry ones being taken out at the top. As often as a new one was introduced the others were raised. This was a great convenience, as the first story could be used as a workshop, the apples going directly into the tower, while the upper floor was used to store the dried fruit. This style of evaporator has come out with a great many variations, and with as many different inventions for hoisting the trays during the process of drying. Alden raised his trays with four endless chains. Williams used two towers, with a device so that the trays were lowered in one and passed up through the other, being taken out and put in at the same place. Now most of them build a tower of brick like a great chimney, 4 feet square on the inside, with a furnace in the bottom and a draft-hood on the top, above the building. These are practically fire-proof. Alden tried to sustain a claim against all others for infringement, on the ground that his patent covered the use of hot air currents to carry off the moisture, no matter in what form it is used. The evaporating people combined to contest the claim, and the struggle lasted several years. Proof was obtained that hot air currents for drying purposes had been in use in various parts of the country for years. The process was described by writers, notable among whom was Patrick Barry, the venerable president of the Western New York Horticultural Society.

In the first evaporators wood was used for trays, then common iron wire, but the wire had to be renewed every few years, as it would get rusty however well cared for. Then came galvanized wire, as at present used, of which I will speak further on.

Horizontal evaporators have been in use with natural or forced currents of heated air. They were brought into favor during the war of the rebellion, to prepare dessicated vegetables for the soldiers, to keep off the scurvy. If any of you ever enjoyed a supper of soup made of these "desecrated vegetables," as we used to call them, and hard tack, while on allowance, you will hold them in fragrant remembrance as long as life lasts.

As I stated before, steam was used in the first Alden towers, and it has since been tried in a small way in towers; but its success was not satisfactory. Of late it has been used in a large way where the heat is distributed among the apples by a system of steam pipes, and it has produced very satisfactory results; in fact, it seems as though the hot air tower would soon be a thing of the past. After the steam is used in the evaporator it can be conducted through pipes in the working room, thereby doing all with one fire; also a cheaper class of fuel can be used. In the use of steam there are already many claimants for public favor, some of a good deal of merit, while others have their peculiar faults.

It makes but little difference what evaporator you use; the work is the same to prepare the apples. I have reports from men who own evaporators in many different places, and I find that fifty bushels is the average work for a single paring machine in ten hours. Where reasonably fair apples are raised some report as high as sixty bushels, and some even more. Two trimmers, one allowed to each parer; or it might be stated that to run an evoporator of 200 bushels capacity would take four parers, eight trimmers, two spreaders, two sorters, one bleacher, 5 tenders, one foreman and two night workers or about twenty-five hands in all. Of course this will vary a little according to quality of fruit and skill of work hands. The product will be from 1,200 to 1,400 ℔ white apples, and you would use with the most approved steam evaporator about 1,200 ℔ soft coal, and from 20 to 25 ℔ of brimstone.

Great impetus was given to the business of evaporating fruits by the introduction of the method of bleaching the apples after being pared with the fumes of burning sulphur. It had been applied to hops, and in Europe to fruit to some extent, but it was introduced in the evaporator in this country about 1876. As it evaporates, so it bleaches. There are many styles but all accomplish the same work by burning sulphur.

In paring machines there has been great improvement since the one I used at paring bees. Some have even tried driving them by steam power, but we have yet to see any greater average per day than by hand power. I see it stated in the *Canadian Horticulturist*, of November, that apples pared faster than 25 bushel in ten hours will fly to pieces and waste. There are none of our boys that average less than 50 bushels, unless of poor apples, and some even as high as 75 ; yet we are not troubled in that way.

The importance of the enterprise to a community is shown, in a measure, by the amount of money that it puts into circulation, and not so much by the per cent. profit to the man or company who buy their apples and hire help to do the work. It is an industry that gives employment to every man, woman and child in the community, and that of the most active and energetic kind. Girls and women who at other times are driving in their carriages, as soon as the season appears, may be found in the dry house all day. It is not uncommon for the farmer to give to his girls the proceeds of the evaporation if they will run it, and some of them take in a good deal of money, even up to $1,000 or more. As an example of the money brought into a place I will give you the sum paid out by one firm for dried fruit in the little village of Sodus, given to me by Mr. A. B. Williams, book-keeper for the year 1887 :

3,500,000 ℔. white apples at 7½c.	$262,500
300,000 ℔. chops at 3c.	9,000
600,000 ℔. skins and cores at 2½c.	15,000
125,000 ℔. berries at 22c.	27,500
6,000 ℔. plums at 10c.	600
4,000 ℔. peaches at 12c.	480
	$315,080

Other buyers would easily have carried the sum total to half a million dollars. This buyer employed in his packing house the following persons from September 1st to April 1st, inclusive, seven months : one superintendent, one weigh-man, five packers, four facers and six ring pickers ; seventeen persons in all. In packing the white apples they used 70,000 fifty-pound boxes, which loaded 140 cars, and it would require 30 car loads of half inch pine lumber to make the boxes. One box-making firm at that place write me that in the same year they made 75,000 boxes, using 32 car loads of half inch lumber, or 800,000 feet ; 600 ℔. glue, 2,500 ℔. nails, and employed seven men and two boys. You will see by the number of persons required in an evaporator of 200 bushels capacity that it would require 1,200 persons for three months in the evaporators, to produce the white apples alone that this firm bought. Now I think I have shown something of the value of such an enterprise to a community.

Mr. J. Dayl, of Rochester, in an article read before the Western New York Horticultural Society last January, places the entire production of evaporated fruit for the year 1887 as follows :

Evaporated apples,	25,000,000 ℔	$1,125,000
Chops,	8,000,000 ℔	150,000
Cores and parings,	4,000,000 ℔	60,000
Raspberries,	750,000 ℔	150,000
Total,	37,750,000 ℔.	$1,495,000

Giving employment to 80,000 persons at good wages.

The question naturally arises : where do all these apples find a market? Dealers in New York write me that Germany and Holland are their largest purchasers, while those in Chicago say the great north-west and west. Parties in San Francisco say that they ship to the distant islands of the Pacific, particularly to Australia. They say that just now they are having a large demand from Colorado, Utah, New Mexico and even Texas. Prices quoted in San Francisco on the 28th of November are : Evaporated apples, 9 to 9½c.; sun-dried quarters, 3 to 4c., and sun-dried slices, 4 to 5c. You will see by this that sun-dried apples cannot successfully compete with evaporated, and I doubt if expense of manufacturing is very much less. Perhaps I ought to say that there is an exception to this in what are known as "heavy cut quarters," sun-dried, from the northern reserve of Ohio. They are in demand in New York, and have the highest reputation for export.

It was said by writers and others last year, in a consoling way, that a result of the low prices would be to open new markets, and consumers in these new markets once having tasted the delicious fruit, would never again be able to resist. But careful inquiry among dealers fails to furnish proof of any such happy state of affairs, or to reveal any new markets opened. The consumption last year was enormous everywhere, but the general feeling is that there will be a great falling off this year. Western New York, the cradle of the evaporating industry, continues to lead the world, not only in the quality but in the quantity of its productions of evaporated apples and of raspberries. Delaware, North Carolina and Georgia are the leading producers of dried peaches, Virginia of cherries. Blackberries come from North Carolina, and apricots from California.

At the opening of the season this year there was a new disturbing element. It was reported that Germany had refused American evaporated apples cured on galvanized wire trays, and that buyers would pay one cent per pound more to those who used wood. As a consequence many producers put light ribs of wood over the wire, and the trade in wire cloth was completely paralyzed. But the price of apples was constantly advancing; buyers were excited and driving about the country night and day, buying everywhere and everything that they could find. It was soon rumored that those who had said the most were putting all into one pile, whether dried on wood or wire. It was found to make it much more expensive to dry on the wood. All of this caused a general feeling of distrust, and many took the wood off; very few are using it now, and I fail to find that any of the buyers are doing as they promised about paying more. The general feeling seems to be that it was all a hoax on a ruling by the German government against American food products in general. But in making a thorough investigation, I find that the complaint is well founded in certain cases at least. I will quote from those who seem to know.

Mr. P. A. Pincoffs, a member of the firm of Manran, Pincoffs & Co., Chicago, returned from Europe a few days ago. He spent some time in Germany, and was there when the question involving the healthfulness of American evaporated apples was raised in Hamburg, and says :

> The action of the German authorities in this question is not due to jealousy or emnity shown by the German government in regard to food products from America. The measure against evaporated apples, in the first place, is not a governmental one ; but is taken by the Hamburg local authorities, who certainly would and could have no possible object in discriminating against American evaporated apples for the protection of a home industry that does not exist. The facts in the case are simply these : A few months ago a case of sickness occurred in Hamburg, which was ascribed to the use of evaporated apples. The board of health, whose duty it is to examine all articles of food, thereupon took the matter in hand and examined over fifty tons of evaporated apples in the possession of various retailers. The result was that, on careful chemical analysis, a certain amount of zinc oxide was found in almost every lot. In most the percentage was very small, 0.004 per cent. and even 0.002 per cent., but in some it amounted to 0.43 per cent. The decision was then promulgated by the city government that all evaporated apples found to contain zinc or zinc oxide would be liable to confiscation, and the dealers handling them subject to penitentiary imprisonment, for selling articles harmful to the health of consumers. This measure might be considered an exaggerated one, as the percentage of zinc oxide in 90 lots out of 100 is infinitesimally small and cannot harm anybody ; but the fact that some zinc oxide has been found in almost all lots examined stands uncontroverted, and is beyond any doubt – there a foundation exists for the action taken : it was not a feeling against American products, but primarily a feeling of paternal and somewhat exaggerated anxiety for the stomach of German consumers.

A similar case occurred in Amsterdam four or five years ago, since which time the use of evaporated apples in Holland has been falling off. Mr. E. Myers, a member of the firm of Myers & Co, produce exchange, New York city, writes me :

> The use of galvanized wire trays has unquestionably, in instances, left traces of zinc poison in apples, and may easily do so ; but we do not think sufficiently so to affect the consumer's health, unless, perhaps,

> by frequent accumulative use. This, however, is more a question for the chemist than for the merchant. The complaints have come so far only from Hamburg and Amsterdam merchants, and there the government health officers have, in many instances, actually siezed, analyzed and confiscated the goods and destroyed them. A merchant thus exposed to actual loss of all the goods that he may buy naturally stops buying, and as Hamburg has always been far the largest market for American evaporated apples, our export demand this year up to date (Nov. 17) has been almost nil.

From these quotations you will plainly see that the complaint is not one of national prejudice or of retaliation, but one of fact that has got to be met and remedied in some manner. Mr. Myers states that the return to "the use of wooden trays in evaporators, if general, would restore the business to its former proportions. Any extra cost in evaporating by this method would be readily compensated by the additional price that the goods would bring. Unless we can find a wire cloth so galvanized that the acid of the fruit will not affect it, it is clear that its use must be abandoned sooner or later. The fruit acid seems to have a close affinity for either lead, tin or zinc, and as one or all of these are used in covering the wire, it is clear that there *must* be a resultant trouble. The manufacturers of a certain grade of wire cloth claim that their silver finish high grade cloth is proof against the action of the acid. Of course, if it is well covered with silver, their claim can be sustained; but it strikes me that such cloth would be very expensive. The only metals in use that are proof against fruit acid are gold, silver and platinum. The new metal, alluminum, when it becomes cheap, as prophesied, will also meet the case. I think I should prefer to use iron wire cloth, as the iron rust cannot be called a poison, if I must use a wire cloth at all, unless the claims of the silver finish wire can be relied on, or return to wood altogether. Mr. Pincoffs further says:

> As the matter now stands, evaporated apples cannot be sold in Hamburg unless the invoices are accompanied by a chemist's certificate stating goods to be free from zinc, so that the trade in the article there can be retained if a change is made in the process of manufacturing. But it may well be feared that if this change is not made, and further trouble is experienced in different parts of Germany, the German government will take the measure in hand, and having a solid argument against the article, will be only too glad to prohibit its importation into Germany unconditionally.

The following report is made by M. De Lafontaine, a reputable chemist, who has examined several samples of apples evaporated on zinc trays:

> I have investigated the conditions under which zinc and zinc compounds find their way into evaporated apples, and find as follows:
>
> 1. The acid of the apple juice combines with some of the zinc of the trays and forms salts of zinc, which remains on the slices.
>
> 2. The wires of galvanized iron used to make the trays have received an extra coating of zinc, which easily peels off when the wire is bent and mixes with the fruit.

This is a matter that cannot be passed lightly by. It certainly shows a very grave state of things. We cannot question the report of the chemists in Hamburg or Amsterdam, nor should we pass lightly by the report of M. De Lafontaine. If these apples are poisonous to the Germans of Hamburg or the Dutch of Amsterdam, can you tell me of any good reason why they should not have the same effect on the good people of Canada and the United States? If the suggestions of M. De Lafontaine are true, that it may come from the peeling off of the coating caused by the bending of the wire in weaving the cloth, then higher finish on the surface will not prove a remedy. It must be found in some other way.

I trust that manufacturers of evaporated apples will not blind their eyes to these facts, and that before another year the use of lead, tin or zinc cloth may be abandoned for something that will render the taint of poison an impossibility.

After brief addresses by ex-President Allan and Vice-President Morton the meeting was adjourned until 10 o'clock Wednesday morning.

THE QUESTION DRAWER.

On re-assembling at 10 o'clock on Thursday morning the proceedings were continued by the discussion of the following questions from the Question Drawer :

THE ONE JUDGE SYSTEM AT FAIRS.

Q.—Is it better to have one judge than three judges at exhibitions ?

Mr. A. **McD. Allan.**—I would say yes ; it is better to have one judge or two judges than three, for when there are three they stand in each other's way. Where there are three judges there is a strong temptation to shift responsibility of unsatisfactory decisions from one to the other, but no man will undertake the duties of a sole judge unless he feels himself fully competent to do the work. I prefer two judges to three, because, where there are only two, the judgment must be unanimous. In my own department I would far rather judge alone than with two assistants ; for my experience has been that they are anything but assistants.

Mr. **Elliott** agreed with Mr. Allan that the one judge system was preferable, and had been tried with most satisfactory results by the Union Society of North and South Essex. He was not in favor of two judges.

Mr. **Willard**, of Geneva, N. Y., said that in his part of New York they had always adhered to the three-judge system, but he was free to admit that the one-judge system would have many advantages, provided the person could be found who was willing to accept the whole responsibility.

President **Lyon**, of the Michigan Horticultural Society, said that with them the one-judge system practically prevailed, although it was the custom to appoint an assistant who had local knowledge to guide him on some necessary points. The real responsibility, however, rested with the one judge, the aim being to put the judging in the hands of a known expert.

Mr. **Wilson**, of Chatham, agreed with what had been said in favor of the one-judge system. Under the prevailing plan the only man competent to judge an exhibit might for local or other reasons be outvoted by the other two judges, who really were not competent, and this was a deterrent to really competent men when asked to act.

Mr. **Read**, secretary of the Michigan Horticultural Society, said he had seen the one-judge system in operation at county fairs, and had heard no more complaints than when there were two or three judges. He coincided in the view that one expert was much better than three non-experts, or one expert and two non-experts whose judgment might weigh the former down. He thought it a very good plan to have one expert judge assisted by some one of local experience to help him in some matters.

President **Lyon** stated that at the exhibition referred to by Mr. Read they had secured the services of three judges, thinking they would find an abundance of work each by himself, but there seemed to be a tendency on the part of those gentlemen instead of dividing the work to go on and throw part of the responsibility on each other, although that was not at all the purpose of the society.

FRUIT ROOMS AND STORAGE OF FRUIT.

The following paper was read by T. T. Lyon, of South Haven, Mich., President of the Michigan Horticultural Society :

There are two, in some respects, distinct purposes for which fruit retarding arrangements are more or less employed. That to which we will first give attention is for the temporary holding of the earlier and more perishable fruits. These, owing to their very perishable character, can only be retarded for a comparatively short period ; and experience had developed the fact that even with the arrest of decay the flavor deteriorates more or less rapidly, so that little or nothing is to be gained by more than a very temporary holding of such.

The process, whether with early or long keeping fruits, consists in keeping them in an equable, moderately dry condition, a few degrees above the freezing point. This low temperature may be produced by different methods, although it is usually secured by the use of ice, in a room with double walls, ceiling and floor, packed between with dry sawdust or other cheap non-conducting substance, or by the use of what are known as dead air chambers.

Since the warmer air is always found in the upper part of the room, the ice box is placed there; and since the gaseous results of decay are heavier than atmospheric air, the opening, if any, provided for their removal should be placed very near the door of the room. The ice box will necessarily be the coldest object in the room, for which reason any excess of moisture in the air of the room will be condensed upon it, and this will the more readily occur if its surface is of metal. It must therefore be supplied with the means of collecting such condensed moisture, together with the drip from the ice, and carrying the same outside the building; the discharge pipe should be provided with a trap to prevent the admission of the warmer air from without.

The fruits to be held should be in as perfect a condition as possible; rather under than over ripe; and may be in moderate sized packages, or placed directly upon shelves. Bruised or decayed fruits should be rigorously excluded. Such arrangement will be found useful also for the preservation of perishable culinary and other articles.

The arrangements for the preservation of the longer keeping fruits differ from the foregoing mainly in dispensing with the use of ice; and, instead, securing the needful low temperature by employing a system of ventilation, by means of which the outer air may be admitted, when its temperature is low enough for the purpose, excluding it at other times. The fruit should be gathered with the utmost care, when not over ripe, all bruised or decayed specimens excluded, and the packages placed at once in the retarding house, the temperature of the same having been already reduced as low as practicable by opening the ventilators during cold nights and closing them before a rise of the outer temperature. The effect of this will be to avoid the continuance of the ripening process consequent upon the comparatively warm weather which so frequently occurs after fruits are gathered, bringing the fruit thus treated down to the final advent of winter, slightly if at all changed from its condition when gathered—an important point gained, especially in the more southerly portions of the apple growing regions of our country.

A building for this purpose may be constructed of cheap material, if only the work of packing or insulating be so thoroughly done as to effectively avoid circulation of air, save when admitted through the system of ventilation.

Admission to the room should be through double doors, and light should be admitted only when needful in conducting operations.

Fresh air is admitted through a passage from beneath at some central point in the fruit room which should draw its supply from the free outside atmosphere, and should be susceptible of being easily and tightly closed at pleasure. This passage should extend to near the ceiling, admitting the incoming air only at that point; which will thus displace the warmer air which will have risen to that position.

Carbonic acid and other products of decay will, if present, occupy the lower portions of the room. To insure the removal of these the pipe for the discharge of the outgoing air should start from near the floor, passing up through the attic and above the roof, but with its principal opening at or near the ceiling, to be used for the removal of the warmer air, when the temperature is to be reduced. These passages also should be kept tightly closed, except during the process of ventilation.

If both air ducts are opened when the contained air is warmer than the outer atmosphere, the warmer air will pass freely upward and be as freely replaced by the cooler air from the lower duct. This process will continue till the temperatures within and without the room are equalised.

It may, however, become desirable to change the air of the preservatory when the temperatures are such that a spontaneous movement of the air cannot occur. To provide for such necessity the upper ventilating duct should be of metal—ordinary sheet iron will suffice—and in the attic a sheet iron jacket may be placed around it, in which a light fire may be built, the heat of which will at once occasion the draft sought, and the air of the room below be rapidly changed as heretofore described.

Fruit may be stored in such rooms in common barrels, which may be piled one upon another, when the vacant spaces will be ample for the circulation of air when needful for the purpose of ventilation or change ; or it may be stored in open bins, in which case the bottoms should be of slats, with ventilating spaces between, and an open space left for the free passage of air between the bins and the floor, as well as between the bins. In the case of small lots, or of specimen fruits, they may be spread or placed in shallow piles, upon shelves or tables, so as to be open to convenient examination when desired.

A large building of this character will be the more easily maintained at the proper temperature, since the greater bulk of air will vary in temperature more slowly in response to the changes without.

In localities in which the winters are so steadily cold that there is liability of the temperature being reduced to the danger point without the opportunity to avoid it by renewal, the air may be introduced through an underground passage well below the frost line, and a change of air thus safely effected even in the coldest weather.

Fruit exposed to a dry atmosphere is more or less inclined to shrivel and become tough and leathery, as well as to lose flavor. This is especially true of the Russets. For this reason a moist condition of the confined air is found preferable, since in such atmosphere fruit loses little if any of its moisture.

The Michigan fruit shown at the opening of the Centennial Exposition at Philadelphia in May, 1876, which at the time attracted unusual attention, had been largely kept in a building of this character. When placed upon the tables it had undergone so little change that even the stems in most cases were still fresh and green.

The freezing of apples does not occur till the temperature has fallen several degrees below the freezing point of water, nevertheless it is claimed that the best results are realised in temperatures somewhat above that point.

The more limited operations of farm orchardists, as well as the large class of smaller commercial growers, call for arrangements of less elaborate and expensive character than those already described.

With the great majority of these the cellar is the chief reliance for the storage of long keeping fruits. This, however, can only be rendered satisfactory for the storage of winter fruits by devoting it wholly to such purpose, to the total exclusion of vegetables and other articles liable to infect the confined air with foreign odors; and by such ventilating arrangements as shall suffice for the maintenance of the needful low and constant temperature. If preferred a portion only of the cellar may be devoted to such purpose, and partitioned off by a brick or stone wall, all the better if double. If located beneath rooms artificially warmed, precaution will be necessary against the transmission of warmth to the cellar below.

The most convenient and effective device for the amateur or family to be devoted to the temporary storage of summer and autumn fruits, for ripening, testing and occasional retarding for short periods, would be a room, either within or separate from the residence, constructed upon the principles and (excepting the ice) with the fixtures already indicated, in which fruits can be placed either in packages or upon shelves, the latter being preferable, when the specimens are for testing, and which for that reason require frequent examination.

To those, however, who provide for a supply of ice during the warm season, a simple, small room or cupboard built within the ice house, with admission from without, through double doors, will be found effective and satisfactory for the holding of summer fruits, the preservation of specimens for fairs, and other kindred purposes, as well as for the preservation of various domestic products.

Mr. A. McD. ALLAN—I do not know of any subject that could more appropriately be brought before fruit growers and shippers than that on which President Lyon's paper treats, and the points contained in the paper are those which it is absolutely essential that every grower and shipper should have a knowledge of. The shipper is interested, because he wants to get that fruit in the very highest condition of perfection for shipping, and he cannot get it in that condition unless it is stored under the circumstances mentioned in the paper just read. I would therefore very much like that growers would carefully study and observe the principles laid down in it, because by doing so they will be improving their own interests as well as those of the shippers and the country at large. The subject is a most important one and should receive the attention of all fruit growers.

Mr. GARFIELD—I would like to know if there is any means of getting rid of the surplus moisture in case we want to preserve products to be kept dry. In the case of apples, I understand it is better if the atmosphere is a little moist, but if we were going to use the same storage room for squashes or onions we would desire the atmosphere kept continuously dry. How are we going to get rid of that moisture?

President LYON—There is a great deal of matter that might have been introduced into the paper which was left out, partly because it was thought it would serve to excite discussion in which those points would arise, and also that it might not be of too great length. In answer to Mr. Garfield, I may say there was an arrangement such as I have described for gathering the condensed moisture, and the room was kept dry by just that simple process. The ice box was so arranged that all the moisture as it dropped down was caught and carried away, and the air of the room certainly was very satisfactory.

Mr. GARFIELD—My question referred to that style of rooms where they do not use ice, where, when you let in air, you let in moisture, and when you keep the air there still, there are exhalations from the onions or squashes which fill the air. Is there some way of bringing that out?

President LYON—I do not know whether there is anything better than the practice of having substances in the room that will absorb the excessive moisture. Of course that absorption can be carried to any extent that is desirable. I believe that the refuse of salt making is used for that purpose, and has the property of absorbing moisture with great rapidity.

PEACH GROWING FOR PROFIT.

The President then called upon Mr. James F. Taylor, of Douglas, Michigan, to read a paper on "Peach Growing for Profit."

This subject may have reference to the great peach belts of our country, where the cultivation of this fruit forms the leading industry, or it may only include those smaller districts where a few hundred trees are grown in connection with the grain products of the farm. There are small peach belts, of a few acres in various localities, well adapted to the successful cultivation of this fruit. This is especially true where the surface of the country is broken by hills and ravines. Ridges of land that run well up above the rivers and plains and swamps are often exempt from the coldest extremes of winter and the severest frosts of spring. If these ridges and hills have a porous subsoil they are all the better adapted to the growing of peach trees that will produce an abundance of fruit.

In selecting a situation for a peach orchard it is desirable to avoid very frosty localities. The air currents which seem to keep up a constant motion in an undulating country, often afford protection from injury when all other devices fail. Perhaps severe frosts, late in the spring, after the fruit buds begin to develop are more fatal to peach culture than the coldest days of winter. On this account localities should be selected where the fruit buds will not be too much influenced by the warm days of early spring time. Sheltered localities therefore like the south side of woodlands, are not often desirable. An open exposure is preferable, so that the cold winds of spring time may retard all tendency to growth until danger from frost is over. Special reference should also be had to character of the soil and its preparation for trees. A very strong soil is always to be avoided. Loam, sand and gravel mixtures are preferable to clay. Peach wood seems to be much more capable of resisting cold when it is brought to maturity by a slow growth. This can only be secured by a soil that is moderately productive and somewhat porous in its nature. On such a soil clover sod plowed under in the autumn or early spring and well fitted for corn will be in good condition for planting peach trees.

The trees may be planted 16, 18, or 20 ft. apart each way. If the land is strong 20 ft. is not too far, as the trees become more spreading and do not grow so high. With peach trees corn should be planted for two years with good cultivation. After this rye or buckwheat may be sowed and plowed under to good advantage. Cultivation should continue year after year as thoroughly as for a crop of corn. Peach trees will not bear neglect and give good results. During every dry season cultivation should be continued until the middle or last of August. After the trees begin to bear fruit, fertilisers may be used to good advantage on any soil, and on all light or thin soils they are a necessity. The tree that bears good fruit must be fed or it can not feed others. The best varieties for these isolated orchards are doubtless the old standard sorts that have been tested in all parts of the country. With these some new ones are coming to the front to make the list about as follows for continuous ripening :—Lewis' Seedling, Crane's Yellow, Early Barnard, Jacque's Rare Ripe, Hill's Chili and Smock. Some other varieties we think equally good, but this list is long enough for a beginner. Before planting a peach tree it should be trimmed to a whip and cut back to 3 or 4 feet in length. In trimming cut the limbs about one-half inch from the body of the tree so that buds hidden there may not be injured. During the summer after planting superfluous sprouts may be taken off or pinched back from time to time as they appear. In this way trees become shapely without severe pruning. The cultivation of a peach orchard is never complete, unless a thorough search for borers is made once or twice a year.

When the fruit sets full it should be thinned out by hand picking. This work can begin on the early varieties, when the fruit is about like your finger ends, and continued on the later varieties until all have been gone over. When the fruit sets uniformly over the tree it should be thinned out to 3 or 4 inches apart on every limb. Good results can not otherwise be secured.

When the crop is abundant great care must be exercised in marketing in order to secure good results. Peaches are always of better quality when ripened on the tree, and the nearer they can be brought to this condition before they are picked for market the more they will be appreciated by the purchaser. These small orchards, scattered over the country, as good locations offer, will commonly find their most remunerative market near at home. If the price is low in these markets at first it can be reached without middle men, and as the well ripened fruit is presented year after year it will be more and more desired by all who see it. For the home market peaches may remain on the tree until they are well ripened, but for long shipments no soft specimens should go into the package. Peaches should be handled about as carefully as you would handle eggs. Pouring them from one basket or box into another, as you would potatoes or even apples, is highly injurious, even if the injury is at first invisible. It is therefore desirable to pack them for market where they are grown. Pecks, halves and bushels may be used to advantage in this traffic according to the kind of market and quality of fruit you wish to put upon it.

With this brief outline we think no one will be at a loss to improve his opportunities for peach culture in a way that will be healthful to the digestive organs of his customers and remunerative to his own purse.

The net results of peach culture in any locality are variable to an extent that can not easily be defined. The estimate may be made by the tree, or the acre, or the orchard, and in any case be misleading as to the results during a series of years. If a tree five years old produces one bushel of marketable fruit, which would be a reasonable estimate, we still have the wide variation of prices that come from an abundant or short crop. The actual results therefore are similar to other branches of horticulture and husbandry ; sometimes good and sometimes not so good, but where Nature serves the kindly turn of a congenial climate the careful and judicious cultivator of peaches seldom fails of a suitable reward for his labor. The most favored localities are not richly rewarded every year, but wherever the trees and buds can endure the climate there is always great encouragement to plant the trees and gather the fruit.

At the end of his paper Mr. Taylor continued speaking as follows: When there is a surplus, if the fruit is properly handled, it is very seldom the net returns would not be equal to one dollar a bushel--I am speaking of a very abundant year. Peaches are now being used through the country wherever they can be produced to an extent that justifies their production wherever there are facilities for their transportation. Rapid transportation is very desirable when the crop is large. When the crop is small of course the prices run high, as has been the case this year, two, three, four and five dollars per bushel according to quality and the condition in which the fruit was placed upon the market. But we do not regard $3 and $5 as standard prices, because it is only occasional years that we have not a sufficiently abundant crop to enable us to reduce the price below those figures. I have not written anything in regard to the yellows, not knowing whether you would care to hear anything about it. I have been asked by different members whether we have the yellows, and I will just reply to that in a few words, and then I shall be very happy to answer any questions you may desire to ask. We have had the yellows. They commenced first in my place in 1877. I had two or three trees affected that year, and through not fully appreciating the disease at that time, and having my attention drawn away by other work, they were not cut until after the fruit had ripened. I had only about three hundred trees at that time, but the next year forty of them were affected. These trees were green and fresh in leaf as any orchard could possibly be, showing no change of color in the leaf or growth of the tree, but when the time had nearly come for the fruit to ripen it showed that peculiar red that is familiar to everyone that has ever had any fruit affected by yellows. We cut out the forty trees, and the next year we had six, and since that year we have not found the yellows in our orchard at all. A neighbor of mine, in the year in which we cut forty, cut three hundred trees, and for several years past he has not had more than an occasional tree. That is the history of the disease in my immediate vicinity, in a district of country several miles wide and loeg. In other localities where, instead of cutting the trees, they persisted in trying by various means to doctor them, hoping to cure them of the disease, it continued to exist, and spread. Now the growers are so thoroughly convinced of the necessity of taking out every tree that shows sign of the yellows that there is no objection to that course at all. We have commissioners whose duty it is to see that affected trees are cut out. I was one of the commissioners for my township for six years, beginning with 1878, and so I made myself familiar with the spread of the disease in that locality, and with its curtailment from that time down to the present, and the young orchards in our vicinity for the last six or seven years do not show any symptoms of yellows at all.

President LYON.—What would you do in the case of a single peach on a tree showing symptoms, while the rest were sound; would you simply cut away the branch?

Mr. TAYLOR.—I have occasionally heard of cases where men saved the tree by cutting off the limb, but I have never found any such instance myself. I had an Early Crawford, one limb of which, about the size of a hoe handle, showed the disease, and I was not willing to risk it and we took the tree out. I think there are few who will contend that the disease has not already taken hold of a tree that shows it on one peach this year sufficiently to develop it on a large part of the tree the next year. I have seen a man who had one limb or one side of a tree which forms principally in two branches affected by the disease, and it was cut off and the other side ripened healthy fruit, but next year the remaining side had the yellows just as badly as the first, and that experience has been repeated so often within my personal knowledge that I would not risk one branch on a tree, even if it was not larger than a pipe-stem. Peach trees at the present time only cost a few cents, and it is better to put in a new tree than run any risk of the disease spreading in the orchard.

The SECRETARY.—Do you think it can be carried by pruning tools? Is care necessary with regard to the use of the pruning knife?

Mr. TAYLOR.—That is one of the points that has been a great deal talked of, but I am not in possession of any certain knowledge either way, as to whether it is carried by the tools, or if it is necessary to use any acid or anything of that kind on them. It might be necessary if the pruning were done when the tree was in flow of sap, but our trimming is done early in the spring, if possible before the sap begins to flow.

A Member.—Do you burn the trees as well as cut them out?

Mr. Taylor.—Our law requires the burning of the tree. The year we cut so many trees we were particular to pick up the fruit and give it to the pigs, but my orchard was so thickly planted that it was impossible to carry out the trees without brushing the other trees, so I left them until the fruit was picked, and then we destroyed trees and all. We did not take out the roots, however, until our fall work was finished, and then we dug out all the stumps. Where that is done there is no trouble at all. We regard the burning of the trees, after cutting, as an essential part of the work.

A Member.—Would you plant new trees in the places where the old ones came out?

Mr. Taylor.—We have done that with good success, as far as any yellows were concerned; there has been no effect as far as the yellows were concerned. You all know, however, that there is a difficulty in starting a young tree surrounded with old ones. If your trees are sixteen or eighteen feet apart the roots of the old trees so occupy the ground as to take the life out of the soil, and a young tree may fail the second year from causes entirely apart from the yellows; that is the only difficulty we have had in that line. I know of perfectly healthy trees, bearing fruit, which were planted in places where other trees affected by yellows were taken out.

Professor Panton.—What has been your experience in planting the pits of diseased peaches?

Mr. Taylor.—I have cracked many of them to see if there was anything there to grow; I think when the fruit is thorougely diseased there is no meat in the pit to grow. Where a tree is diseased on only one side the pits of the fruit from the other side might grow, and it is just possible that if those pits were already infected with the virus of the yellows it might be injurious.

A Member.—At what season of the year do you plow in the buckwheat?

Mr. Taylor.—There is a two-fold object in plowing under buckwheat, one is to get the vegetable matter under to fertilise the soil, and the other to counteract the working of the cut-worm. Buckwheat seems to be one of the crops the moth of the cut-worm does not like, and the more we sow buckwheat that way the less trouble we have with the cut-worm.

A Member.—Don't you find that your late cultivation is very apt to induce a late growth, leaving your trees and buds in a tender condition for the winter, and so liable to winter-kill?

Mr. Taylor.—The error in peach cultivation is the other way. My experience is that the cultivation of a peach orchard ought to be late enough in the season so that the fruit buds will not ripen before about the middle of September. Stop cultivating in July, and on ordinary dry soils the leaves will show ripening in August and turn yellow. As the leaves ripen the fruit buds for next year begin to develop and show. Suppose we have a warm September, these fruit buds will enlarge all through the fall if it is warm. Now if the growth is kept up on these trees until the 1st of September, if it is a dry season especially, cultivation is desirable, and if they have fruit more desirable still, because the quantity of fruit and dryness of the soil will produce earlier ripening of the wood. After the wood is once ripened the nature of the peach, if the soil is warm enough, is to start again. A December like the present continued on through January would bring out peach buds on the lake shore altogether too early. We have had one such season since I have been on the shore in twenty years, when the peach blossomed on the 10th of April—the only season in the twenty years when the peach has blossomed before the 10th of May. The trees did well enough, only the cold winds and rains of May stopped the growth of the tree and the fruit for a week or ten days. Then it came warm again, and the new growth threw off not only leaves but fruit that year. The damage done in that way induced a number of men to go to extremes in cultivation. If up to the middle of July we get continuous wet weather, let the cultivation be cautious from time to time, but if dry weather continues do not be afraid to continue until you are pretty sure the dry season is over. We must keep up moisture by cultivation if we cannot get it from the clouds.

A MEMBER.—What implement do you use for cultivating?

Mr. TAYLOR.—My own practice is to plow the orchard once every season; near the tree we use a one horse plow, and back from the rows either a gang plow or a single plow set very shallow, not more than four inches deep.

The SECRETARY.—What style of package do you use in Michigan?

Mr. TAYLOR.—We have tried almost every style that has been on the market. For a number of years past the successful package is a round basket with what we call a railroad cover. Then in our immediate vicinity we have the four-basket crate of slats, with a slat cover on top to hold the four together. During the last two years the long basket with a handle has become quite popular; the commission men in Chicago are preferring that one very much, and we may be obliged to adopt it.

The SECRETARY.—I have just a word or two to say regarding the distance apart of peach trees. Mr. Taylor puts the distance at twenty feet. That was the distance at which we originally planted our old orchard, but of late I have been planting about twelve feet, and by careful pruning I keep the tree in a bushy form. I find this distance to be quite far enough apart, especially in view of the danger of losing the trees by yellows. It seems advisable to keep our ground more closely occupied and the trees severely pruned. We have all noticed where we have neglected to prune the peach tree, that it runs out very long arms, with all the fruit on the straggling ends of long branches, and of course they occupy more ground than is necessary. I think the mode of pruning I speak of not only keeps the tree in better health, but we get a greater number of fresh young shoots and more fruit. Then in regard to fertilisers, I have been using wood ashes altogether for my peach orchard, and I have been exceedingly pleased with the result. I believe it affects the color and size, and perhaps the flavor of the fruit. So much is this the case that I daresay some of you have noticed that in Massachusetts it is claimed by Mr. Hale that muriate of potash is a specific cure for yellows, which, however, we have very great doubts about.

A MEMBER.—What time of the year do you prune?

The SECRETARY.—I prune in March or early in April, before the growth begins.

Professor PANTON.—What quantity of ashes do you apply?

The SECRETARY.—At least half a bushel of unleached ashes to a tree yearly. The soil is sandy loam.

A MEMBER.—Do you keep ashes close up to the trees?

The SECRETARY.—No, decidedly not; we scatter them on the ground under the tree, out nearly as far as the limbs extend. Then with regard to thinning the fruit. I believe, though I never can find time just at the period of the year, that judicious pruning and shortening of the ends of the bearing wood early in the spring, and thinning out all the sickly wood, will accomplish that object as well as any other way.

A MEMBER.—What is the best time of the year to look for the grubs of the Peach Borer?

Mr. TAYLOR.—As soon as the frost is out of the ground in spring, so that you can do it conveniently, and then during the summer just before the eggs are deposited again for the new crop. If whitewash is used with some carbolic acid it is likely to keep them away.

A MEMBER.—We have always looked for borers about the month of June.

Mr. TAYLOR.—Well, I think I should take a little later time than that, because so long as the insects are flying around depositing eggs in the bark of the tree it is hardly worth while to go around and pick them out. But if gone over at that time with a brush great good will be accomplished in keeping them away. I would sooner go around a little later than that, before much damage is done. I think if you wait until late fall much damage is done.

The SECRETARY.—It is simply an egg that is deposited in June, and you could not find the egg at that season.

Mr. Taylor.—As soon as they begin to do damage the sap that oozes out will form a gum around the tree, and then you may be sure there is something wrong about it, and the more gum there is the greater the damage, because it shows the tree has been more severely injured—the first little indication shows that there is something wrong. If you find a little hole trace it right down with the point of a knife.

The Secretary.—With regard to the borer, I think the best way is to keep him out altogether. It is a great deal of trouble to go over a peach orchard and hunt out the borer after the breeding season. I think most of the gentlemen present are aware that the moth deposits the eggs in the months of June, July and August, and that the egg is deposited about the surface of the ground, in order that the grub may find its way into the root, which is the tender part, and where it most delights to live and work its mischief. Now, if we can prevent the moth from reaching that part of the tree we shall save the tree and save ourselves considerable hunting for the grub, and even when we do hunt they sometimes escape us. I have found it the simplest and easiest plan to put a bank of earth around the trees, which can be done by a man with a spade very rapidly. By doing this about the first of June or earlier the moth is entirely beaten. If the egg is deposited in the dry bark of the peach tree higher up it will do little or no injury. I have had very little trouble with the borer since I adopted this method.

Mr. F. W. Wilson.—Would that work all right with apple trees too?

The Secretary.—No, because the borer can work anywhere in the apple tree.

A Member.—Is not the effect of heaping the earth around the tree in the way you describe, to make the bark tender, and will not the grub be able to work on it there?

The Secretary.—I have never found it work in that way.

Mr. Caston.—How would it do to wash the tree with some alkaline solution? I do not know how it would work with peach trees, but it is a very effective remedy with the borer in apple trees.

Mr. McMichael.—I had a three-acre orchard of Northern Spy apples banked around, and in the spring the frost or rain had made a little trough, and I nearly lost some trees; they turned black in spots.

The Secretary.—If the mound of earth is put closely around the tree and packed close to the trunk I think it would shed the water. I do not think you could have had it packed closely.

Mr. Taylor.—I would like to say something about that banking up, because we have practised it. You take a peach tree in its second or third year, it has quite a top, with pretty heavy foliage, and a tree that is banked up will sway in the wind until at last it makes a little cavity around the trunk which forms a very nice place for water or anything of that kind to lodge in, and necessitates re-banking before the ground is frozen. We have had our trees barked at the bottom from swaying against the frozen ground. We have also had that cavity filled up with water running down the tree, when ice would form there; and many of our growers find there is considerable risk in banking peach trees if they allow the banking to stand during the fall and winter. If the borers are looked after during the summer months, and kept out until the tree gets large and the bark hard, there is not much difficulty after that in keeping them out; they don't have much effect on a tree eight or ten years old. It is while the tree is young that there is trouble in keeping them off.

The President.—Mr. Woolverton's plan is to bank in the spring, and that obviates the difficulty with frost in the winter.

QUESTIONS ON PEACH CULTURE.

(1) What list of six kinds pay best in the county of Essex?

Mr. Mitchell (Leamington).—I may say the borer is one of the greatest troubles we have in this section of the country, and I have come to the conclusion—though I have never tried it—to take a piece of stovepipe or sheet iron and put it around a hoe or rake handle until it is tight and then spring it and put it around the tree, and as the tree grows the pipe will expand with its growth.

The **Secretary.**—I might mention here that a firm in Hamilton have prepared wire cloth especially for that purpose, and I believe it would work very well.

The **President.**—What varieties are cultivated here?

Mr. **Mitchell** (Leamington).—Well, the Crawford is a very fine peach, but it does not yield enough returns. I think the Smock is one of the best, but Reeve's Favorite is one of the finest and most productive I have ever planted. Almost every variety succeeds where I live. Good cultivation is one of the principal objects in getting good peaches; I do not believe in putting a crop in the ground, but in plowing it.

The **Secretary.**—Why don't you grow the Old Mixon?

Mr. **Mitchell.**—Because it is so unprofitable; if we get a dozen off a tree it is the outside in a good year, and two years out of three we don't get any.

The **President.**—Can you give us any idea of the extent of peach growing in your locality?

Mr. **Mitchell.**—I know one gentleman who has 18,000 trees. He must have picked this year in one week about 2,400 baskets of one variety. I think he averaged about 400 hundred baskets a day of one variety. It was originated, or he got it, near Ridgetown. It is a yellow peach of very good flavor, and with a small pip; medium early, ripening a little after the Early Crawford. It is called the Tyhurst Seeding.

The **President.**—Would you advise anyone planting a peach orchard to plant it?

Mr. **Mitchell.**—Most decidedly I would.

Mr. **Elliott.**—Has anyone else got it?

Mr. **Mitchell.**—No, unless he has let them; no one has it in bearing, The gentleman I speak of has shipped peaches from his place by the car load.

Mr. **Baldwin** (Essex).—I commenced by propagating seedlings from a tree. Some of my neighbors told me I could not propagate the Crawford from the seed, but I can show as fine Crawfords in my orchard as can be seen anywhere propagated from that tree. I have the tree the last speaker tried to describe (Tyhurst's Seeding). It is a very profitable tree to have in an orchard, and will produce itself from the seed. I find I can derive more profit from my own trees than from those I buy from nurserymen. I have the Waterloo, the Early Canada, the Shomacker, Alexander and several other varieties.

BEST VARIETIES OF PEACHES FOR NIAGARA DISTRICT.

The **President.**—I see I am down on this subject, and I may say we grow there as a standard the Crawford. The question asked is, The best six varieties. We would take for early the Alexander, or it does not matter much if we take one of those others, the Schomacker or Early Canada. That is our first peach, and the Early Rivers is our second. Then after Crawford's Early I think a good deal of the Wager, which comes in immediately afterwards, and is a profitable peach. After that we have a local peach called the Bowslaugh, a very fair peach, and one of the surest of any we have for a crop in that locality, I think. The Late Crawford is a good peach when we can get it, but in a great many localities it is a poor bearer. I have been very favorably impressed during the last season with a peach about which I think our friend Mr. Willard, of Geneva, N. Y., can tell us something. It is called Steven's Rare Ripe; it is the Oldmixon over again, but a week or ten days later, and, with me, a much better bearer. The Wheatland is considered first-class when we can get it.

A **Member.**—What about the Foster?

The **President.**—The Foster is similar to the Early Crawford; it would puzzle some folks to tell the difference, though it has generally a little rounder form and higher color.

A **Member.**—Could you detect the difference between it and the Wheatland?

The **President.**—I think I could

Mr. **Willard.**—Steven's Rare Ripe is an old peach, and yet a comparatively new one. The results attained by a gentleman on the Hudson river in producing that peach were so wonderful that it attracted considerable attention. I think the peach was noticed twenty years ago, but, like many other good things, it has been lost sight of until now. It is sufficient for me to say that the greatest returns I have ever read of were obtained from that peach on the Hudson river, and it has been growing in favor very rapidly. It is a late peach, coming in just before the Smock—a large, fine white-fleshed peach, usually red on one side and very productive, and the fruit-bud seems to be hardy. We had a very fine crop of them this year, which we sold in Buffalo at 85 cents to $1 per peck basket. You can judge from that how it is received in the market. It is becoming with us, or has already become, one of the standard varieties. The quality is good and people want it; it is a free-stone entirely.

Rev. C. N. Matthews (Kingsville).—What about Hynes' Surprise?

Mr. Willard—I think I was the first in New York to grow it. All I have to say is that it is all that it is claimed to be. We have marketed two crops and sold them at very satisfactory prices. It is one of those early peaches following the Rivers that is absolutely a freestone—something it is difficult to get. Hynes' Surprise is absolutely a freestone.

A Member.—Do you ripen the Catawba grape where you are?

Mr. Willard.—Yes; we have ripened the Catawba grape at Geneva.

EXPERIENCE IN PEAR CULTURE..

The President called on Mr. J. K. McMichael, of Waterford, Ont., to give a paper on his Experience in Pear Culture.

About twenty-five years ago, while we were planting a plot of three acres with Northern Spy apple trees, we set in one corner of the orchard a dozen pear trees. The soil is a sandy loam, slightly facing to the south. We had a variety of six or seven kinds in our group of pear trees. The best return we have had in profit from any one of the trees, has been from a seedling grafted with Bartletts about seventeen years ago. The Winter Nelis proved to be a shy bearer and an uncouth tree, but free from blight. A fine Howell tree blighted badly nine or ten years after being planted, and the whole top had to be taken off to the trunk; some sprouts grew, however, and the tree now is one of the largest in the group, producing fine, saleable fruit. Two trees of the Early Harvest were fine growers, maturing heavy crops of fruit, but not giving satisfactory returns in cash; they were, ten years ago, grafted with Bartletts, and are producing large yields of first-class fruit. Clapp's Favorite has been a fine growing tree, giving a quantity of large No. 1 pears; but the past season it was severely blighted. In this plot, by planting trees from the nursery, we have not been successful with either the Bartlett or Flemish Beauty, but the fruit has rarely been affected with a fungus.

In Plot 2 the soil is limestone and sand, and gently slopes to the south. In 1871 we planted in one corner of this orchard fifty pear trees. Two or three of the varieties were sadly disappointing when they gave a return in fruit. Instead of the order as sent to the nursery being filled and returned true to name, the nurserymen claimed and took the right to substitute other similar kinds to the ones in the order, when they did not have the varieties ordered in stock. The consequence was that some of the substituted varieties were worthless in the locality sent. The Bartlett trees planted in this soil made but a small growth. The fruit has been mostly free from blemish, and a fair-sized sample. The Flemish Beauty shows a fair growth of tree, but the fruit is considerably blotched, and in size and quality is No. 2. The Lawrence is a poor growing tree, and yields a small quantity of fruit of medium sample. Clapp's Favorite is a large, fine growing tree, with heavy crops of first-class fruit, but is blighted badly. Beurre Bosc is a fair growing tree with very heavy crops of large No. 1 fruit. Beurre D'Anjou, a fine tree but a shy bearer.

Plot 3 is located on the north side of a somewhat sharp-sloping ridge running east and west. The upper side of the field is a sandy loam, and the lower side clay. Formerly the land was very wet from spring water oozing out above the clay, but since under-draining the land has been very productive. In this plot we planted 100 Bartletts, 25 Flemish Beauty and a few each of half-a-dozen other varieties, making a total of 154 pear trees. For a few years we found it necessary to cut off a part of the year's growth, to keep the trees in shape, and the fruit, especially that of the Bartletts, was remarkably fine. At this time a part of the orchard was severely stricken with fire blight. In the south-west corner of the orchard stood a large apple tree which was very badly diseased with twig blight, and to the north-east from the apple tree, across the pear orchard, nearly every tree was apparently almost ruined with blight. We removed the apple tree and burned the diseased portion of it. From the pear trees we sawed off all the affected limbs below the discoloring of the bark and burned them. The trunks and remaining limbs of the trees then received a coating of raw linseed oil. Similar treatment was applied to the trees for the succeeding two years, and that trouble disappeared until the past season. In this plot, eight years ago, the Bartlett, Flemish Beauty, and some of the other kinds were attacked with the Fusicladium, and for five years we did not find a single specimen from the Flemish Beauty that would be saleable. The Bartlett pears were not quite so bad, but the trees suffered very much worse than the Flemish Beauty. The Bartlett trees suffered so severely that the limbs were nearly black and waxy to the touch from a gum-like substance that oozed out of them. Three years ago last spring, before the pear trees were in leaf, we sprayed them with a solution of hypo-sulphite of soda and water, using one pound of the sulphite in ten gallons of water, and continuing the application every two weeks until the fruit was about half grown. The Flemish Beauty was remarkably fine and free from blemish, and the Bartlett trees rallied up wonderfully, but bore very little fruit. The other kinds in the plot were free from fungus. The following spring the trees received two applications of the sulphite, one before and the other soon after the trees were in leaf, and then we waited about five weeks, when the fungus was developing on part of the pears and some of the leaves. The pear trees forthwith received a spraying with the sulphite, and another in a few days. We could not discover any further development of the fungus. The Flemish Beauty pears were a fair crop of saleable fruit, while the Bartletts were an overloaded crop of fair fruit, very many of the trees requiring props all around them. The past season the sulphite was applied, and the pear trees were nearly free from fungus, but most of the fruit was destroyed with the May frost.

Plot 4 contains ten acres of clay loam, and is located south of the ridge. It is sheltered from the north by an orchard of large apple trees, and on the other three sides by a wind break of Northern Spy apple trees set one rod apart. Eight years ago last spring in this field there were planted 1,000 Bartlett pear trees. About 600 of these trees are very promising, 160 are dead from several causes. Possibly 200 were black-hearted and had vigorous roots. Most of them had sprouts to grow just above where they were grafted, but some only below, and from these sprouts, by cutting all of the diseased trunk off, we have fine, healthy trees.

The pear trees are pruned lightly each year, and the bark slit down the trunk with a sharp knife. They receive a mulching every spring with coarse, barn-yard manure, and, in the fall, a liberal dressing with unleached ashes. The fruit is thinned out with a pair of sheep shears. The older orchards are summer fallowed, and the younger ones tilled for a hoed crop. The plowing around the trees is done with a one-horse reversible beam plow.

A Member.—Are your orchards standards?

Mr. McMichael.—These are all standards; I have had no luck with dwarfs.

A Member.—How far apart do you plant them?

Mr. McMichael.—Those in the plot of 154 trees were seventeen feet, and in the plot of 1,000 trees twenty feet apart each way. For five years we did not have any fine specimens on the Flemish Beauty.

The Member.—Have you tried spraying with Paris green?

Mr. McMichael.—This past season I mixed hypo-sulphite of soda and Paris green, and it seemed to have a double effect upon the leaves. I would not recommend the use of the two together. Two or three years ago I had the sulphite mixed up in a large kettle, but did not get it all thoroughly mixed. If it is a little strong it has the same effect upon the trees that Paris green has.

Mr. Patterson (Grimsby).—I have used hypo-sulphite of soda and Paris green together on apple trees, and found no ill-effects whatever from the mixture ; but I never use them on pear trees. With me the use of Paris green on pear trees seems to prevent the knotty, gnarled specimens almost entirely. Of course Paris green has no effect at all on the fungus.

THE QUESTION DRAWER.

When the Association met in the afternoon

The President said.—I have here a telegram from the Hon. Mr. Drury, stating that he is unable to leave Toronto to-day, to attend our meeting, and expressing his regret.

The following topics were discussed from the question drawer :

PEAR CULTURE AND UNDER-DRAINING.

Q.—On the heavy clay soils of Essex and Kent, which are covered with rich vegetable mould, will the cultivation of pears be successful without under-draining, and in such lands will under-draining pay ?

The President.—I should say emphatically yes ; underdraining will pay for any kind of fruit.

Mr. Willard.—My own experience has led me to believe that all lands on which pears are grown should be under-drained, unless it is naturally under-drained. We find that dwarf pears do better on certain kinds of lands, while standards do better on other kinds, and, from the statement of the case here, I think the land would be admirably adapted for dwarf pear growing if it were sufficiently under-drained. Dwarfs do not want to stand with their feet in water, and although they do not run down a deep root like standards, they like to have it reasonably dry.

A PREVENTIVE FOR MICE AND RABBITS.

Q.—What is the best preventive for mice and rabbits getting at trees ?

The Secretary.—It seems to me that Mr. Wilson, who asks this question, could have very well answered it, as I heard him say he was the suggester of the wire screen protector for trees.

Mr. Wilson.—In our part of the country (Chatham) we have a great deal of trouble with mice and rabbits, and I invented the screen which the secretary has referred to, and it is a good thing. It is just the ordinary wire screening rolled on a small broom-stick, and the spring keeps it in place so that it won't slip. It keeps the mice and rabbits away, and can be left on the tree until it is large enough to need no protection. We leave it on from one year to another until the tree grows up. I put out 2,000 apple trees two years ago and put it on them all, and they are all there yet. Buying the wire wholesale it costs, if I remember right, about 2½ or 3 cents per tree.

Mr. Rice (Port Huron).—I tried one little experiment on mice. I had some trees set along a fence row and the mice troubled me ; so I got some tar paper and tied it around the tree with a light piece of string, putting it around three or four times. I had doubts whether it would stay on all winter, and I was much surprised to find it became hard, the string came right off, but the paper has remained intact around the trees three years, and they have been perfectly protected. The expense is almost nothing. The tar paper becomes hard and keeps its place and expands with the growth of the tree in the same way as the wire that has been described, and it has proved perfectly effectual for the purpose intended. I had one large tree, six inches in diameter, that was notched by mice. It had been in that condition one year and I tried the experiment on it. I bevelled off some sprouts that had grown up from the bottom, shoved them under the bark above, and had a load of fresh stable manure packed around the tree quite high. That was four years ago, and this year the tree shows very good health, and has borne quite a crop of apples.

Mr. Beall.—The most effectual thing I know of is simply this: do not allow a blade of grass or anything of the kind to grow in your orchard, and I will guarantee there will be no mice.

The Secretary.—If you get a snowbank there, you will have mice, whether there is grass or not.

Mr. Beall.—If there were no grass there would be no mice; mice do not breed in the snow.

Mr. F. W. Wilson.—I find the trouble with the tar paper spoken of by our friend Mr. Rice is that it excludes the air, which is very injurious to the tree.

Mr. Caston (Craighurst).—Mr. Beall is right in saying that if you keep the orchard clean you will have no mice, but no matter how clean you keep the orchard there is always grass around the fence.

Mr. Rice.—In regard to the health of the trees, those I speak of were very unhealthy looking, but they have improved in health each year, and this year they are fine and healthy, after having the paper around them for three years.

SPRAYING TREES WHEN IN BLOOM.

Q.—What can we do to prevent people spraying trees while they are in blossom, and in so doing destroying the bees?

The Secretary.—I should suppose that if the opinion of this Association is sent abroad that it is unwise to spray at that time, it would be sufficient.

Several Members.—Yes, I should think so.

The Secretary.—Then I move this resolution: "Resolved, that it is useless to spray our fruit trees while they are in blossom, and in the interest of bee-keepers this Association hereby unanimously condemns the practice." Carried.

SEASON TO SPRINKLE WITH POISONS.

Q.—What is the proper time to sprinkle fruit trees with poisons?

The Secretary.—The proper time is just after the petal of the blossom has fallen as soon as the fruit has formed. That is the proper time to make the first application of arsenical mixture to the fruit trees. It should be repeated after a heavy rain, because the rain will wash off all the poison. I may here remark, as something has been said about it, that in Grimsby our fruit growers have found that three ounces to fifty gallons of water is a sufficient quantity to use.

COMPARATIVE VALUE OF FERTILISERS FOR ORCHARDS.

Q.—What is the comparative value of fertilisers for orchards?

Prof. Panton.—I think this question might be better answered by a practical man than by me, who am only a teacher of science and its principles, as far as applicable to plant life. I think, however, that on general principles the potash fertilisers seem to bring about the best results for horticultural purposes. There are certain elements very essential to plant life, and one of them is iron, which is very important to the preparation of the green coloring matter in plants. But there is generally sufficient of that in the soil. This green coloring matter in plants is what enables them to take the gases from the atmosphere, and out of these the properties necessary for plant growth. Another element very essential for that purpose is potash. You may have the green coloring matter present in the plant, but before it can do any work in the way of the preparation of starch there must be light, and even in the presence of light it can do little or nothing without potash. It is just as if you had a fine factory with all the belts and pulleys and a grand engine in it; but until you got a fire going and steam generated your apparatus would be of no use. So in plant life there is no element which has more influence in working the whole manure than the element of potash; and I would therefore say, on general principles, that potash fertilisers are likely to bring about the best results.

F. W. WILSON.—I agree with the professor both practically and theoretically that ashes is one of the best fertilisers we can get. But just now there never was a business so entirely ruined as the potash business, owing to German mineral taking the place of potash. There is no demand for it, and we should take advantage of the opportunity thus created. There was never a better opportunity for fruit growers than at present. I have engaged two of the largest mills around Chatham to supply it at four cents a bushel, and some of these are producing three or four large waggon loads per week. I would advise you all to try the same plan in your own neighborhoods.

Mr. DEMPSEY.—I do not know of any manure better than bone dust, and if you can dissolve it in sulphuric acid it is all the better. I applied it in that way very liberally, and the result was that the next year I had one of the finest crops of Flemish Beauty I ever had in my life.

Prof. PANTON.—You should add a little super-phosphate.

MILDEW AND OTHER FUNGI.

Q.—Is the Industry gooseberry free from mildew?

The SECRETARY.—With me it has been; with the President it has not.

Mr. BEALL.—There is only one kind that is worse with me.

Q.—Please inform us what causes mildew on grapes, and what will cure the disease also what is the cause of the grape rot and what is the preventive?

The SECRETARY.—The mildew referred to and which is most common in Ontario is a fungus—really a plant. I cannot explain its causes except to say that it is propagated as other plants are, by very minute spores, which can only be seen with the help of a microscope. As to the cause of the grape rot, it is also similar, a fungus. I believe that a copper sulphate is one of the best preventives for this, or the Bordeaux mixture, applied with a whisk broom in the absence of a proper spraying apparatus.

Q.—Is the statement made that mildew only attacks plants already affected by disease?

Prof. PANTON.—I do not think the statement is made that they attack no other, but there is a tendency to attack that type more than any other class, just the same as a weakly person is more subject to disease such as typhoid fever than a person who is perfectly healthy. That disease is caused by germs, as many diseases of a more or less epidemic nature are now admitted to be. So with fungi, weakness in the vigor of the plant renders it peculiarly liable to attack. I have no doubt it may attack strong plants from time to time, but the tendency is to attack those weakened by disease. All these fungus diseases are caused by germs or spores getting into the plant structure in some way. If the plant is healthy and vigorous it very often goes no further, but if it is weakly it passes right on to its juices and begins to grow. There would therefore be a greater tendency in mildew to attack weakly plants than more vigorous ones.

Q.—Is the statement true of fungi that they are mainly nitrogenous in substance?

Prof. PANTON.—I have never noticed that statement so much as this, that they live on nitrogenous substances—for parasites live on food already prepared. Fungi cannot take up the carbonic acid of the atmosphere and give off the carbon and oxygen; that is the function of the green coloring matter, to elaborate out of it starch ultimately, and the fungi cannot do it. They are parasitic and must be put on the place where the food is; consequently they are always found in those situations. But I do not think the question is clearly put. All organic matter is more or less nitrogenous, not excepting sugar and starch. If the question was, "Do they live on nitrogenous substances?" I would answer that they invariably do, as far as my knowledge goes.

Q.—Is the practice of manuring with nitrogenous substances good?

Prof. PANTON.—You mean so as to avoid this? Well, I think there might be some specific times when it would not probably be well. It has been ascertained that fields of wheat, where nitrogenous manures have been applied in excess, are more likely to be affected by rust. Why? Because they have brought out too luxuriant a growth, and consequently the cells are more or less in an abnormal condition, which renders them liable to the rust. Now, that is the case with rust. I am not just prepared to say it is the case with other forms, but where there is too luxuriant a growth I think a plant is placed in a position in which it is liable to attacks of parasites, and in that case a person requires to know the nature of the soil. If the soil is already in good heart and likely to bring about a fair condition of plant growth, I do not think it wise to overdose it with nitrogenous manure. I should say too much barnyard manure would not do if the land was in fine condition.

VALUE OF COAL ASHES AS A FERTILISER.

Q.—Has soft coal ashes any virtue, such as oxide of iron?

Prof. PANTON.—I am inclined to say not very much. You will be likely to have enough oxide of iron in your soil. I cannot say what the composition of soft coal ashes is, but as far as hard coal ashes are concerned there is nothing there; all they can do is to open up the soil, and I would think pretty much the same in the case of soft coal. There may be some sulphide of iron, and that may supply some iron, but I do not think there is much in it.

HOW TO BEST PRUNE A COMMERCIAL VINEYARD IN ONTARIO.

The PRESIDENT.—We will now take up the subject of grape pruning, on which Mr A. McNeill, Science Master of the Windsor High School, who is also an extensive vineyardist, will now address us.

Mr. McNEILL.—I expect that my remarks will have the effect of eliciting considerable criticism, and I hope to profit by it, as pruning the grape vine is a very serious question with me. I have invested some little cash in the enterprise, and it has now reached such proportions that it is a case of swim or die. I have been led to study the nature of the grape, and to attempt to apply the principles learned to the pruning of it, and I have selected a number of points in grape growth that I think we can apply directly in the pruning. First, we notice that the growth tends to divide itself into many small branches. Allow a grape vine to grow unrestrained, and you will have a number of fine, small branches in the first, second and third year. These branches will not produce fruit for a number of years, and then only very small fruit. Secondly, it has a strong tendency to develop the higher buds; in the natural course of things these higher buds would develop and the lower buds would go undeveloped, although now there is comparatively little difference in their relative strength. Thirdly, other things being equal, the buds are developed neither at the base of the cane nor at the top of it, but mid-way—I am speaking now principally of the Concord. Fourthly, that a sharp bend in the cane has a tendency to develop the bud just above it. Fifthly, the construction of the terminal bud while in the green state has a tendency to hasten the maturity and development of the tissue and buds below it. The effect, however, varies with the distance from the terminal bud. That is to say, if I take this while in the green state there will be a tendency to develop the bud next to it, and a certain tendency to develop the next, with the effect of lessening as we get further from the bend. Sixthly, with a strong growth in one cane rests the growth and developments of the other canes. Now, I have selected out of a number of principles these six, and propose founding whatever system I may present you upon those six principles. (From this point onward

Mr. McNeill's address was so profusely interspersed by illustrations on a trellis on the platform as to render it impossible for the reporter from his notes to give a transcript which could be understood by a reader).

Mr. Read.—The heaviest crop of grapes I ever saw was upon a lot of Niagara vines in the County of Kent, Michigan, and the man who had them pinched off the summer new growth at the second bud, or thereabouts, above the fruit, immediately upon its setting. He practised that throughout his whole vineyard, and the fruit developed largely, and the leaves grew to twice the size of those upon the vine left to grow free. It seems to me that with the Concord it would be equally good.

Mr. McNeill.—It is a question of cost.

Mr. Read.—This gentleman has probably got back all the cost in the increased crop of grapes.

BEST MODE OF MARKETING GRAPES.

The President.—Mr. M. Pettit, of Winona, will take up this subject.

Mr. Pettit.—The best mode of marketing grapes is a rather difficult question to deal with, when considered from the fruit-grower's standpoint, as much depends upon the distance from the market, the requirements of the market, and so on, which must be studied by the growers themselves. Samuel Miller, writing in *Popular Gardening*, says: "The man who shall devise a plan whereby a man shall get what he earns by growing fruit will deserve a monument." I am not a candidate for that monument, but there is a great deal in the remark worthy of consideration by the man who grows fruit for profit. As most of us know, carrying companies and commission men take about one-half the receipts, while the grower has to almost beg for the other half. In none of the products of our soil is the difference between what is paid by the consumer and the amount received by the producer so great as in the case of fruit. This may be partially accounted for by the perishable nature of fruit, and also the channels of trade through which it flows. Care in picking is of great importance with grapes. Pickers who are too careless and lazy to lay grapes in a basket, but drop them in like potatoes, should not be allowed in a vineyard. As a rule women and girls make the best pickers; they handle more carefully, and display more taste in making them look neat. You must please the eye of the buyers, who judge by appearances, and keep your packages neat and clean. For the commission market use the best baskets, and let the color of the leno correspond to that of the fruit. In shipping for dessert purposes, let nothing go in the basket but what you would eat yourself, or put on your own table for your friends. Shipping green grapes has cost the grape growers of Ontario thousands of dollars, and has done more to glut the markets than any other cause. Growers, in haste to make money, have allowed their vines to overload. This has caused the fruit to be poor in flavor and late in ripening. Then to secure the early high prices they are picked as soon as fairly colored, which has done more to disgust people with using grapes than all other causes. I venture to say that one-half of the grapes grown in Ontario are picked and marketed before they arrive at the state of perfection. Another cause of overstocked markets is changing from one market to another to try for high prices. Montreal and Toronto are our two largest distributing centres, and when Montreal reports high prices and good demand, shippers send to Montreal. The consequence is that the market there is overstocked, and Toronto being neglected the tide turns there and prices go up and the same thing it repeated. If every grower would ship to his nearest and best market regularly certain quantities every day, they would would work off at higher prices and give better satisfaction to the consumers, who would receive daily good fresh fruit, and there would be better satisfaction throughout. Another mode of marketing grapes, not always profitable, is consigning them to commission firms or merchants who start business with the spring birds, who distribute large quantities of shipping tags throughout the fruit growing sections and quote better prices than the old established firms.

Q.—What sized baskets are usually used?

Mr. Pettit.—Ten and twenty pound baskets are used in our locality for the bulk of our grapes; twenty pounds is a sixteen quart basket. It is too large, and I think if that basket were entirely done away with it would be much better. A basket such as peaches and plums are shipped in, and which holds sixteen pounds, is fully large enough. The cheaper grapes are usually shipped in the larger baskets.

Q.—Don't you get better returns from small packages than large ones, when they are nicely put up?

Mr. PETTIT.—A few years ago, when the smaller baskets came into use, I think we did as a rule, but there is very little difference now.

Q.—For early grapes or choice varieties, would not the small packages yield the best returns?

Mr. PETTIT.—Yes, I think they would.

Q.—What varieties do you find bring the best returns, in shipping?

Mr. PETTIT.—The Worden, Concord and Rogers No. 4 are what I would plant in our locality for black; and for red, Delaware, Lindley, Brighton, Agawam, and Catawba in some sections. For white, Niagara stands the season pretty well, and is such an enormous yielder that it is far more profitable than any other white grape.

Q.—How do you find Salem in your section?

Mr. PETTIT.—It is more liable to mildew than most of the red Rogers, besides, if we get a shower when ripe, they burst badly; but for winter use I do not think we have a grape in Ontario to beat it.

Q.—Have you tried Amber Queen?

Mr. PETTIT.—Yes, but not to any extent.

PURE GRAPE WINE FOR HOME USE.

The President announced that Mr. E. Girardot, secretary of the Vine Growers' Association of Sandwich, would answer the question, "What is the simplest way to make a small quantity of pure grape wine for home use?"

Mr. GIRARDOT.—I believe I have undertaken quite a task in answering this question, for it takes nearly as much time and knowledge to make a small quantity as to make a large quantity. I will explain, however, just as I would to some of my neighbors if they asked me, First, the person making it should know a little of the nature of the grape. Now the grape itself consists of the skin, which holds the coloring matter, and part of the tannin of the grape; the juicy or watery part, which contains the sugary part of the grape; and the pulpy part, the fleshy matter, which contains tartaric acid; and the fourth part or element is the seed, which does not go into the making of wine. It contains a kind of volatile oil which you may call fusil oil, which would be a nuisance in wine if it were crushed when the grapes are crushed to make wine. In some parts of the country here the wine makers prefer to take the stems away from the grapes. This, in my opinion, is not right, because the stem of the grape contains a great amount of tannin, which is the preservative element in wine, and has the effect of making it keep for years, which it would not otherwise do. Of course in order to make a small quantity of wine one should know what amount of grapes to buy. Well, it is generally recognized that from eighteen to twenty pounds of grapes is sufficient to make one gallon of wine. The next thing is a vessel to ferment that wine in, and for this I would recommend a whiskey barrel. Take out the head, and in the bottom put a bundle of straw, and over that straw put a brick well cleaned, and then make a hole and put in a faucet. Next comes the pressing of the grapes. You may take a small vessel and in it put a certain quantity of grapes and crush them enough to break the berry, and then put them in the barrel. Do not fill the barrel completely, because the carbonic acid gas makes the wine rise, and if it is too full it will overflow and you will lose the wine. Generally the vessel should not be filled more than two-thirds; one-third should be left for fermentation. Now, there is a great question in making wine that is fit to drink. I believe our grapes here are grown in as great perfection as in any part of Ontario, the climate being very favorable to the maturing of the grape. Generally the juice of our grape contains from 20 to 22 per cent. of saccharine matter; but this has been an exceptional year, and they have contained 25 per cent,, which would make a wine very rich in spirit. It is a recognised principle in chemistry that the saccharine part of the grape is converted by fermentation so that twenty parts of sugar would give 12 per cent. of alcohol. We must allow something for the organic matters in wine which do not ferment, and it also loses by evaporation—we cannot get all the alcohol from a given amount of sugar. Generally we can make a natural wine here, if we do not add any sugar, containing not more than 10 per cent,, which we find is not quite enough to fit it for shipping purposes. Such a wine would keep very well in a cellar, if not moved, but if it is to be shipped to any distance it will get turbid and is apt to turn sour, and the only corrective for that is to add sugar or spirit to it. It is not good to add spirits, because in this country we cannot obtain wine spirits. The wine spirit is what we call amylic alcohol, and that we cannot obtain here. We can buy grain spirits, but these do not assimilate with wine spirits, and for that reason any wine in which grain spirits have been put cannot be digested very well; the least quantity will inebriate, instead of cheering as wine ought. Therefore we use the sugar, which by fermentation is converted into alcohol, and by a chemical process converts itself into grape sugar, and of course results in the wine alcohol. Now, the question is, What quantity of sugar shall we put in to obtain a given quantity of alcohol? Well, experiment has taught us that one-quarter pound of sugar added to one gallon of mash will give one degree of alcohol. The sugar cannot be added directly, because we would lose a great deal that would get into the skin and the stems, and therefore we have to dissolve it in water. This raises the question of how much water? If we use too much we shall weaken our wine, and therefore we only put just enough to dissolve it. We have found by experiment that one gallon of water to twelve and a half pounds of sugar is the quantity in order to have a wine having the same virtue and the same component parts as the natural grape contains by itself. This water has also a beneficial effect on the wine. Our grapes contain an excess of tartaric acid, although they do not contain more sugar than the grapes in the same latitude in France or Germany, and this excess is corrected by adding water and makes the wine more palatable. The next operation is the fermentation, and the temperature that we should maintain or place the barrel in. It is a wise plan when we put the solution of sugar in it to heat that small quantity of water, so that when we add it to the wine it will not arrest the fermentation which may have already begun. The object, on the contrary, is to hasten fermentation; the quicker the fermentation the better the wine. Long and slow fermentation only produces turbid wine, which is never palatable, whereas quick fermentation produces good wine, which is always clear. The temperature I should recommend in which to ferment wine is about 70°. It is very essential after fermentation has commenced to keep the temperature up. If you should put it in a place where cold air strikes, it will stop the fermentation, and that is injurious to the wine. It is a wise plan to cover the barrel or vessel in which the wine is made, because if that precaution is not taken it is covered with a kind of fungus which may afterwards cause the wine to turn sour, and therefore the wine must be watched from the beginning. Now as to the duration of the fermentation. This should generally last about eight days in our latitude, We know that the wine is fermented when we discover by the taste that it is not sweet any more. When putting the wine in the vessel to place in the cellar you must not bung it right away, because there is a slow fermentation going on for three months afterwards, and if the barrel is tightly bunged it may burst and you would lose the wine. Wine is generally made here in the month of October, and about December we look at it to see how it is getting along. If it is clear you may draw it into another barrel. You must always use clean barrels. Some people use spirit or beer barrels, and I may tell you that there is no liquid so subject to being affected and taking on a taste from the vessel in which it is put as wine. One day a man ordered a gallon of wine from us, and in his jug there was a musty cork. I filled his jug from a barrel where the wine was perfectly good and palatable, but before he got home the wine in the jug was in such a condition as not to be fit to drink, from the effect of the musty cork. Therefore either a musty barrel, or one that has been in the shed a long time, cannot be used; it is better to buy new barrels. You can never clean a barrel that has a bad taste well enough to make it fit to contain wine. Barrels that have contained whiskey, port wine or native wine are the best; barrels that have contained gin or ginger wine are of no use for wine. I think that is all I have to tell you, and, if you will follow the directions I have given closely, you will be successful.

PLUM CULTURE.

The PRESIDENT.—We have two questions here regarding plum culture, which according to the programme will be answered by our friend, Mr. S. D. Willard, of Geneva, N. Y.

Mr. WILLARD.—The first question of the two on the programme which I have been asked to answer is, What are the six most profitable varieties of plums for Southern Ontario? I may say that I don't think I am the proper person to reply to that question, as I am not a southern Ontario man, but a New Yorker; and I think there are those in this room much better able to answer it. I will, however, answer it from my own standpoint.

The SECRETARY.—I think the climate is very similar.

Mr. WILLARD.—The question of plum culture has lately been attracting a great deal of attention. My attention was first drawn to it twenty years ago, when visiting the Hudson river country, which at that time was really producing more plums than all the rest of the United States put together, and those who were raising them were getting rich. The fruit was exceedingly large, and they had splendid facilities in getting it on boats for the New York market, but their system of culture was wrong. They robbed the land; they sold their hay and straw and put nothing back on the land, and the result was, before they knew it, that they could no longer raise fruit with profit; and the plum business of the Hudson river is now a thing of the past. But seeing their work is what led me to take it up, and during the last twenty years I have done something in the way of raising plums. The plum has multiplied very rapidly; new varieties have been springing up here and there to be tested and tried, and it is a very wide field in which to work. The list I am about to give does not include some I could raise, because I am not sure they would suit you here. Foremost, as the earliest ripening plum, I would put the Bradshaw, which when young is a little tender, but when aged is one of the most hardy and productive market plums we have. I have trees of that variety from which I have netted as high as \$12 or \$14 in a single season, and that is good enough for me. Following the Bradshaw is the Lombard, which is among plums what the Concord is among grapes or the Baldwin among apples. It is a plum which can be raised with less trouble than any other variety, always gives good crops and always has a market value, for it is known everywhere. Then we have another plum called the Gueii, which originated in Lansingburg, N. Y. It is a very hardy and profitable market variety; it takes on a most beautiful blooom, and if only well known will sell well. I have found it one of the most profitable of plums, and it is very productive. In time of ripening it follows the Lombard.

President LYON.—I think it is said to be curculio-proof, do you stand by that?

Mr. WILLARD.—No; I do not believe that of any plum. Then we have what is known as the Hudson River Purple Egg. That also had its origin on the Hudson river, and was introduced to me by a fruit man who asked me to test it. You will not find anything about it in Mr. Downing's work, for when I sent it to Mr. Downing he said it was a plum he did not recognise. But it is one of the best for market purposes. It is hardy and productive, and sells well on the market. Then we have the plum known as Peter's Yellow Gage, introduced by Mr. Barry of Rochester. All things considered, it is in my opinion the best of all the light-colored class of plums, and yet it is scarcely known; you will not find it in the catalogue of Ellwanger & Barry. It is not one of the best growers; nurserymen cannot make money out of it as rapidly as out of some others, but all things considered it is the best light plum grown, being extremely hardy and producing a crop of the finest quality every year. Its disadvantage as against La Reine Claude, which is the standard light colored plum, is that it comes in earlier. If it ripened as late as La Reine Claude I would say it was the best of the light colored plums to plant for market, but it comes in earlier. The advantage of La Reine Claude is that it comes in later. I obtained my stock eighteen years ago, and during last season we have topbudded 150 trees to continue it. Then for the sixth there is Coe's Golden Drop, which ought to be planted. We have had experience sometimes in winter killing, and in picking these varieties I have endeavored to select those which hold their foliage well, because that is a very important point. The Imperial Gage we have dropped, because the tree is tender. Of the light colored ones I do not know one that is more tender than the Imperial Gage, and it is not the equal of La Reine Claude in productiveness. I have omitted La Reine Claude because I do not know whether it would be considered hardy for your section, and yet it is the "king bee" of all the plums. I have had trees that yielded as high as $20 in a season.

The Secretary.—It is perfectly hardy in western Ontario.

Mr. Willard.—Yes; but I desire to say that the plum is a capricious fruit. It may be entirely hardy here and not with us, and vice versa. I think that is the experience of anyone who has grown plums largely.

Mr. Dempsey.—La Reine Claude is perfectly hardy in part of our county (Hastings) and tender in other parts, but there is nothing better in the form of a plum for canning. I cannot grow it at all, while a man who lives only twenty miles from me succeeds every time.

A Member.—What about the McLaughlin?

Mr. Willard.—It originated in the State of Maine and is of very fine quality, but not a profitable market plum. It is almost of the highest quality to eat.

The President.—What have you to say of the Niagara plum?

Mr. Willard.—Well, if you plant good Bradshaws I am sure you will get a good list of Niagaras. Shipper's Pride is a very good plum a little north of us in the State of New York. It is a very fair plum, but not what we were led to believe. The Jefferson is of the highest quality, but not productive enough for market, being in this respect the same as the Washington. Quackenboss is a very desirable plum, but we find it has a little inclination to shyness in bearing. There are places where it succeeds well; I have seen it very fine on the Hudson river, but there are others which we think more profitable. The Gueii is much more profitable to raise than the Quackenboss.

A Member.—Do you know anything about Glass' Seedling?

Mr. Willard.—Only as I have tested it myself. Some of them were sent to me by this Association a good many years ago, and we tested them in a small way. I thought it was so near akin to the Quackenboss that it was not worth while propagating it. Pond's Seedling is a fine plum, but it makes wood slowly, and is not productive enough of dollars and cents. The Victoria is a very fine plum some seasons; then, again, it is liable to over-produce, and the fruit is small and fails to ripen well. The General Hand is a fine plum in appearance, but does not produce enough. The Peach Plum is hardy; one of the most hardy we have. There are six other varieties I would be very glad to mention in connection with the six I have already named as my choice, which I think are valuable. The Prince of Wales is a most beautiful plum, of very fine color and very productive and hardy. It is comparatively new here, though I heard of it years ago in England. Then there is the Stanton, which originated in Albany county, N. Y. If I were to name only one plum for canning I don't know but it would be this one; if it were two years hence I could tell better. We have now over a thousand trees that will be in bearing next year. It is one of the finest to eat, and we have kept the plums for weeks in our cellar sent up when ripe from Albany county. I think anyone making a test would do well to plant it. Then there is the Field, which ripens a little ahead of the Niagara, and is like it in size and appearance, except that it is a little darker in color. It is a very desirable new sort, and had its origin in Scoharie county, N. Y. Then we have the Grand Duke, one of the latest introductions from England, originated by Mr. Rivers, which promises to be the best late plum of dark color that I know of for market. We had the fruit this year for the first time for market, and it brought a dollar a basket in eight pound baskets. Mr. Rivers brought out three plums, the Grand Duke, the Archduke and the Monarch, which in my opinion are going to make their mark in this country. Anyone who saw the exhibition of fruit at Buffalo this fall might have seen the Monarch. It is one of the largest of plums, and bids fair to be very hardy; the tree holds its foliage very well and is very productive. Then there is one of the Japan plums called the Botan.

President Lyon.—Are not there several varieties of that name?

Mr. Willard.—Yes, there are. That is a sort of general term for a number of those plums sent out from Japan, but having received this one under the name of Botan we raised it as such; we have another under the head of Botan which is a little different. This summer I obtained two others called the Sweet Botan and Burbank's Japan. I had enough to market this year of Ogan, but I saw they were not going to take, and that was sufficient for me.

A Member.—What do you think of Basset's American?

Mr. Willard.—I don't thing it is worth enough powder to blow it over the fence.

A Member.—What about Munro's Seedling?

Mr. Willard.—It is tender with me; we never grew a plum so tender in the nursery row as the Munro.

A Member.—Have you planted Prunus Simoni?

Mr. Willard.—Yes. It may be hardy and sufficiently productive, and will be sold at fruit stands even if it is not of the first quality. They want it in the cities, though it is not strictly first-class.

THREE BEST PLUMS FOR HOME USE.

Mr. Willard.—I see there is another question: "What are the three best plums for home use, early, medium and late? Quality, productiveness and hardiness of tree tree alone to be considered; soil, light sand?" I think I should take the Bradshaw for the first, then Peter's Yellow Gage and the Stanton Seedling as my choice.

A Member.—Does not the Lombard do well on light soil?

Mr. Willard.—Yes, I have seen it do remarkably well.

A Member.—In our neighborhood they have adopted what they call the French stock, which does not sucker as much as the standard stock.

Mr. Willard.—We use French sometimes because we cannot get any other, but if I were selecting an orchard I would prefer, if possible, to have them worked on the horse plum stock of western New York. But they will all sucker bad enough if you cut the roots; you can plow them to death a good deal easier than kill them any other way. I would advise people who have plums to do their work with cultivators.

Mr. Dempsey.—Did you ever try any of Rivers Damsons?

Mr. Willard.—Yes, I have the whole list of them now; they are succeeding first rate.

A Member.—How far apart do you plant them?

Mr. Willard.—Our plan originally was 16 feet each way, but now we get our rows 16 feet apart and ten feet in the row; you can handle them better, but it wants high culture. I would not advise anyone to do it unless he has the manure.

A Member.—Do you spray your trees for curculio?

Mr. Willard.—As I remarked to-day if it were not for curculio I would not raise plums. God put us here to fight something, and we might as well fight these pests as anything else. So far as spraying is concerned, if I were to spray I would use Paris green. We experimented this year with London purple, to our sorrow, for it cost us about $500 to learn that London purple was better somewhere else than on plum trees, or perhaps any other trees. It is soluble, and no matter how careful you may be you may touch some of the very sensitive plum foliage. We have used Paris green, but I don't want to hold the nozzle all day myself, and I cannot trust men to do it; they fool away their time, and put on so much that they injure the foliage of the trees.

SALOME APPLE AND RUSSIAN APRICOT.

Q.—I would like to know whether the Salome apple is in any way better worth planting than the Baldwin, and also if the Russian apricot is worth planting.

President Lyon.—It does not show any fine qualities beyond being hardy. It is hardy enough for central or northern Illinois, but beyond that it has been found to fail. Its quality is not good and is not particularly attractive. It is claimed to be a good producer, and might do very well for a market apple, but there are so many more desirable apples that I question whether it is worth planting at all.

Mr. Willard.—I have not the greatest confidence in the Russian apricot although we grow them, but we have to do so in our business; we have to grow what people want and demand. I have very great doubts of its value, and would not recommend it.

SEEDLING FRUITS.

Q.—Should not the Association appoint one competent man as an expert, to examine and report upon all new seedlings fruits in the Province that may be sent to him?

Mr. Beall.—I think it would be an excellent idea.

Mr. Bucke.—Anyone who heard the address of Prof. Saunders of last night will remember that he said he would be very glad to receive at the Experimental Farm any new fruits or trees, and I think he is a very competent person.

President Lyon.—The trouble with us has been that there are a great many people who will not take the trouble to inform themselves of what is being done, and are always ready and waiting to be imposed on by travelling tree pedlars who will tell them anything.

Mr. Dempsey.—I fall in with the idea, and I think no better man than our secretary could be selected, but I think he would like the assistance of Mr. Saunders and some others in some instances. I move that Mr. Woolverton be appointed as one of the committee to receive fruits as suggested.

The President.—Mr. Woolverton has been acting in that capacity, and you have received some of his reports through the *Horticulturist*, and if only one man is appointed I think he is the proper man. It would be well enough, as Mr. Dempsey says, that he should have one or two others associated with him with whom he might confer in special cases.

Mr. Dempsey.—I move in addition that Prof. Saunders, the ex-President, Mr. Allan, and the President, Mr. Smith be appointed on the committee. Carried.

RAILWAY FREIGHTS.

The question was asked, "Is it wise to interview the railway companies regarding a special fruit train service, on the ground that the express companies are no longer competent to carry the ever increasing shipments of fruit in a proper manner?

Mr. T. H. Race said in reply that last summer he had got from the secretary of the Association three baskets of choice peaches, and that when they had arrived they had all been broken into. On complaining to the company, it was stated that this was no unusual occurrence. He then threatened the company with prosecution, and also to complain through the Fruit Growers' Association to the Legislature, asking for legislation to protect the public from such pilfering. The agent sent the complaint to headquarters At the same time Mr. Race enquired whether others in the town had similar complaints to make, and found that it was a common occurrence to have fruit packages pilfered on the train. In about two weeks a reply from headquarters came, giving the agent written authority to settle Mr. Race's claim and hush up the matter; but this he was unwilling to do until there was some guarantee of safer transportation.

The following letter, from the Grand Trunk Railway Company, was handed in and read by the Secretary :

As regards cars being specially fitted with shelves for holding the baskets to prevent the fruit being bruised by the baskets when piled on top of each other. This has been done to some extent by the G. T. R. Co., but it takes so long for the cars to return,—say from Montreal—that practically it is impossible to provide enough of such cars, the season being so short, and they cannot be used for other freight on the return journey, it must be apparent the cost to the Railway Co. would be too great, excepting in the case of short distances, such as between the Niagara district and Toronto where the cars can return daily and therefore a few of them can do a large amount of work. The circumstances here are very different, the distances being so great However this difficulty of damage by bruising has been solved to a great extent by the new style of basket manufactured in Walkerville, as several tiers can be piled on top of each other without injury to the fruit. On behalf of the G. T. R. Co. I may say that the importance of rapid and cheap transit is fully recognised.

THOS. DOW.

The following letter also, from the Grand Trunk Railway Company, was handed in read by the secretary :

In regard to shipping facilities for grapes and small fruits generally so far as the Grand Trunk Railway is concerned : The possibilities of this district for the cultivation of fruits generally have been recognised, and for several years efforts have been made to encourage those engaged in the forwarding of this traffic viz. by allowing cars to go direct to their destination, even when loaded with but a small quantity of fruit, rather than load the same car for several stations. There has been no hesitation in forwarding three tons direct at any time, but even as low as 1,500 ℔ have been sent. As a rule there is no delay in reaching the larger places in good time, as there is always other freight that can be used to fill up a car. But the difficulty arises with small lots, more especially when for places off the main line. Such consignments are apt to be delayed more or less at junction points, but three days should be the maximum time in transit in any case. We have been able to give quick despatch to Montreal, Toronto, Hamilton, and London shipments, cars going direct, and those interested may rest assured that no effort will be spared to co-operate with shippers in reaching the markets as speedily as possible.

HEDGES FOR SOUTHERN ONTARIO.

The PRESIDENT.—Mr. McNeill will now address us on the subject, "What kind of hedges are best suited for Southern Ontario."

Mr. McNEILL —Hedges are of particular interest to fruit men ; as you are well aware they serve the purpose of a wind-break and a protection from the inroads of animals and as an ornament. I think those three purposes are served by hedges. I was converted to hedges by a short visit to England, and I think Canada will never be really beautiful until it has its hedgerows. As a matter of protection against animals I am not altogether so sure that they are a success. I am afraid that in the case of cows the unsightly wire fence is ahead of it, and I do not see how it is possible to grow a hedge for less than a wire fence can be constructed for. In the case of the wire fence you have the protection at once, while in the case of the hedge you must wait a number of years, so merely for protection I do not think the hedge is a live question for many years to come. There is another aspect, however, of particular interest to fruit growers—the wind-break ; it is conceded that the wind-break is of material advantage to the fruit grower, and it is from that and the æsthetic standpoint that it must stand or fall with them, for on the score of cost it cannot compete with the wire fence. Twenty-five years ago I helped my father to plant a white willow hedge. We took long pieces of willow limbs and dug a narrow trench and put our willow sticks down five or six inches apart, and had no trouble whatever in getting them to grow. My father left that neighborhood a year or two afterwards, but I saw that hedge about five years ago, and it was a perfect solid wall of vegetation, through which a mouse could hardly crawl. But I think it was costly as far as the occupation of ground was concerned, and white willow must pass out of consideration altogether. My father and I experimented with the common thorn.

The special thorn I am speaking of is called the Cockspur thorn, which is more easily described to the ordinary individual as a species having a perfectly smooth leaf and being thickly set with thorns. After several failures in our experiments with this we got both the method of growth and the plant that answered the purpose as a hedge plant. Our error in growing it was in allowing it to grow too high before cutting it off, and as a consequence in one or two years there were bare spaces below, but after we had some experience we found that we must get a strong bottom growth after which there is no difficulty in getting a perfectly impenetrable hedge, and a hedge that will last for ever. The advantages of this thorn are these: First, it is a perfectly hardy plant; you cannot kill it by any ordinary method. It will stand dry weather, cold weather, or wet land to any degree found in land fit for cultivation; it will stand browsing which only improves it, and, in every way, it makes a splendid hedge. Its growth, however, is too slow to satisfy most people, and it has one other fatal defect I am afraid. So far we have always been able to get our supply of the plant from a river bottom flat, but if the plant is ever to become a hedge plant it must be propagated in some other way, and I do not know how it can be cheaply propagated. I was informed by Prof. Saunders that the seeds are exceedingly slow of germination, and if that is the case it is a serious defect, but I think it is worth while to experiment with root cuttings, from which some of the same family are very readily developed. Our experience is simply that we take these plants from a river bottom and plant them out, and in about four years they mske a hedge that will turn anything and that gives little or no trouble in the way of trimming or pruning. The hedge in question is so close that nothing can make its way through it, but mice or small birds. The birds make their nests in it, and it is a most excellent protection for them, and if for nothing else I think hedges should be grown for the protection of the birds which are such friends of the fruit grower.

FRUIT AS FOOD.

At the evening session a paper was read by Mr. L. Woolverton, Secretary of the Association, on this subject, as follows:

One of the best ways of increasing the selling price of our fruits is to educate the public into a freer use of them. Fruits are too often looked upon as mere luxuries, agreeable to the taste but useless when nourishing food is required. We find the citizens buying meat and potatoes regularly, but the fruits are only purchased occasionally as a special treat. When the family go from the city to the country in summer, the mother is in constant anxiety about the amount of fruit her children consume, and is surprised when the dreadful results anticipated do not follow. This craving which children have for ripe fruit is one proof of my first point, viz.: (1) The free use of ripe fruits at our meals tends to health and longevity. No doubt there are many persons present who can verify this position from actual experience. I have heard men say that in the autumn, when harvesting grapes and eating freely of the fruit, they have noticed an increase of weight of from five to fifteen pounds. So well acknowleged has the healthfulness of the grape been that, in France and Germany, patients are treated with what is called the "grape cure" for many diseases due to overfeeding. A French physician says that nothing does more to rid him of his patients than the daily use of fruits; and another says that since the apple has been more freely used in Paris, there has been a decrease of dyspepsia and of bilious affections. We all know with what avidity the fevered patient sucks the cooling juice of the ripe cherry. I have in a previous paper, referred to the healthfulness of the currant in dispelling headaches and reinvigorating the system.

Not only on the score of health, but also on that of economy, we can speak a word for the use of fruit. Meat is one of the most expensive articles of diet, and in summer time not the most wholesome. Indeed, some physicians trace autumnal diarrhea to the use of meat in the hot weather, giving rise to alkaloids which are purgative in their effects. The fruit often gets the blame for what is due after all to the meat. A grain and fruit diet, according to an eminent English physician, is in summer more healthful and less expensive than a meat diet.

Fruit contains the elements necessary for the nourishment of the body, as will be seen from the following table showing the composition of the strawberry, viz.:

Water	87	per cent.
Sugar	4	" "
Free acid	1¼	" "
Nitrogen	0¾	" "
Insoluble matter (½ per cent of which is ash)	7	" "

Who objects to being convinced of the healthfulness and economy of the strawberry in summer as contrasted with a meat diet? Prof. Faraday says of apples :

> Let every family in autumn lay in from two to ten or more barrels, and it will be to them the most economical investment in the whole range of culinary supplies. A raw mellow apple is digested in an hour and a half, while boiled cabbage requires five hours. The most healthful dessert that can be placed on the table is baked apple. If taken freely at breakfast with coarse bread and without meat or flesh of any kind, it has an admirable effect on the general system, often removing constipation, correcting acidities, and cooling off febrile conditions more effectually than the most approved medicines. If families could be induced to substitute the apple—sound, ripe and luscious—for the pies, cakes, candies and other sweetmeats with which children are too often stuffed, there would be a diminution of doctors' bills, sufficient in a single year to lay up a stock of this delicious fruit for a season's use.

The moral of all this is : Let every farmer plant a fruit garden with such a selection of varieties as will furnish him with a constant succession of fresh fruits for his family, and let every townsman make arrangements for a constant supply of fresh fruit from the fruit market.

The second point I want to emphasize is this : (2) Apples form one of the most valuable articles which can be given horses and cows in connection with their daily allowance of food. In point of nourishment alone they are equally valuable with carrots for horses and with turnips for cows, and more valuable than mangels pound for pound. On page 95 of the Report for 1887 will be found a table prepared by Prof. L. B. Arnold, in which he shows that ripe apples have a feeding value equal to one-third the value of hay, about 16 cents per 100 lbs, or 8 cents a bushel. I believe that this is far too low an estimate and in this I am supported by a Mr. E. H. Hutchinson, an American farmer, who says :

> For the general purpose horse of the farmer, I know from actual experience that apples are valuable food. I have had horses that were in very low condition, from worms, entirely freed from this trouble when running among apple trees, where they eat all they want. I believe that a horse not at hard work would do as well on four quarts of oats and a peck of apples as on a peck of oats per day. If this statement is true, it would give apples a feeding value of about 20 cents a bushel.

It will be observed that we have here a practical farmer giving apples about two and a half times the value which Prof. Arnold has allowed to them, viz.: 20 cents per bushel, or 40 cents per 100 lbs. Now if this can be proved it will open up a new way of disposing of a large portion of our apple crop, and increase the value of the farmer's orchard. If apples can be shown to be worth 20 cents a bushel as food for stock, surely we need not fear over-production or market gluts. And if weight of testimony is of any use, here is another from a writer in *Orchard and Garden*. He says :

> When some of my pear trees littered the ground with their ripe, mellow fruit, I fed them to my cows. A peck of pears, with two quarts of meal and bran for a noonday feed increased the milk and butter one-fourth, and when the apples were ripe and cheap in the market, the horses, cows, pigs and fowls had all they wanted.

Here are two quotations from the *Michigan Farmer*. Mr. Charles Dann says :

> I have fed apples for twenty years quite extensively. During the past three years I have been feeding twelve cows with them. As soon as the apples attain any size and drop from the trees, I have them picked up and thrown in the pasture. Some days the stock get as much as ten bushels and I can always see an increase of milk. The apples are of different varieties, but not very sour. Cut down all trees which produce apples that will not do to eat. I am feeding two bushels of Baldwins at one time to my cows and get an 8½ quart can of milk extra from the fruit.

> I have been interested in discussing the value of apples for stock. I had last winter 600 bushels of apples and began by feeding them to my team, giving them at noon instead of grain, and with apparent gain to the horses. If the team was hard at work it probably would not answer. I had a pen of fatting hogs to which I had been feeding a bushel of apples for their noon feed. I had no means of making accurate tests, but think they did equally well. I also gave them to my cows, a peck at one feeding, with the result of increasing the yield both of milk and cream. I have also fed them all winter to pigs which I am keeping over. I am convinced that to feed apples to stock is as profitable and much more satisfactory than to sell them to be made into cider with the possibility if not the probability that its use will lead to the use of stronger intoxicants.—*E. A. Bradley.*

And to accumulate evidence here is a quotation from a writer in the New York *Tribune :*

> A few years ago one of our largest apple growers had a large lot of culls left over. He was offered 10 cents a bushel for them delivered to an evaporating and cider-making concern five or six miles away. Instead of selling them at that price he bought hogs to eat them. I am at this time unable to recall the details of his method, but whatever other feed was given them was accuraaely weighed and measured, and the gross cost at market prices and all other expenses, except the labor of feeding the apples, were duly charged up against the hogs till they were killed and marketed, when it was found that the apples had netted him 32 cents a bushel. The only case of ill result was where a large herd of cows were turned into an orchard of several hundred trees and permitted to gorge themselves without restraint. Like any other food, apples should be fed with much discretion, beginning with small rations and increasing them gradually.

For several years I have myself been experimenting in this direction, and must say that I am more than satisfied with the results. Last winter I fed a team of horses about seventy-five bushels of cull apples which were unfit for shipping. They were fed with cut hay or cornstalks, and chop stuff made of peas and oats ; and a part of the time of corn and oats. The ration was made up about as follows : One bushel of cut hay or cornstalks, one peck apples and one quart chop stuff. This was given the team twice a day when idle, and three times a day when at work, with about 8 or 9 lb. of hay at night. The result is that the team came through the winter in a far better condition for work than ever before. There was no need of condition powders with that team. The old coat of hair was shed early in the spring, and the new one was remarkably sleek and smooth ; and everyone exclaimed on seeing them, "In what fine condition those horses are." I tried the same diet on a two year old heifer, giving her the same ration twice a day. That beast is now as fine a one as can be seen for miles around, fat and sleek and healthy. I have therefore given up growing turnips and carrots for stock, for I find in my waste apples food as valuable for their nutritious qualities as roots, and more valuable for their condimental qualities.

Having, then, such numerous ways of disposing of our fruit crops the encouragement becomes greater for growing them. We can evaporate or feed to stock all second grade apples and pears, and thus relieve our markets of a class of apples which glut them with rubbish, and anger the busy housewife. Thus also we shall be able to cull closer our fruit for shipping, and only put up for export the choicest grades, which will bring the very highest prices ; and secure for our Canadian apples the reputation which their excellence deserves of the very finest in the world.

Prof. J. H. PANTON, of the Ontario Agricultural College, Guelph, then gave his lecture on "Fertilisation of Plants," a most interesting and valuable address, illustrated by a chart of colored engravings. This has been published in the Report for 1888.

The evening was enlivened by some excellent music, contributed at intervals by the Detroit Medical College Glee Club, together with solos from Messrs. A. D. Bowlby and W. Paterson.

Resolutions of appreciation of the kind and courteous treatment by the town of Windsor, of thanks to the press, and to the Glee Club were most heartily passed by the Association,

The Mayor of Windsor, and others, replied in suitable terms, and the meeting was closed with "God Save the Queen."

THE SUMMER MEETING.

The summer meeting was held in the Town Hall, Old Niagara, on Tuesday evening, July 8th and Wednesday, July 9th, 1890.

The President, A. M. Smith, Esq., called the meeting to order at 8 o'clock on Tuesday evening, when an address of welcome was read by Mr. R. Courneen, President of the Niagara Fruit Growers' Association.

The President replied to the address in fitting terms, and declared the meeting open for discussion, suggesting that the Venerable Archdeacon McMurray, of Niagara, should address the audience.

INTRODUCTORY DISCUSSION.

Archdeacon McMurray.—I was very much delighted when I heard that the present meeting of the Fruit Grower's Association was to be held in this town, having long thought that one of its meetings ought to be held here. I have vary carefully followed the various meetings of the Association in different parts of the province by means of its publications, of which I am a constant reader, and which I think should be taken and read by every person at all interested in the growing of fruit or in horticulture. I am delighted that you should have met here, and anything I can do or say in furtherance of your objects I shall do most cheerfully. A most interesting paper was recently read before the society here by Mr. Billups, on the curculio, of which he exhibited numerous specimens. I should like to hear that paper repeated during the course of the present meeting. The curculio is an enemy we have to strive manfully against and I am afraid will attack our peaches as well as plums. I think we may learn something practical during this meeting regarding gooseberries. I have some fine gooseberries, but almost all mildew as the trees get older, and the only thing I can see to do is to keep plantations coming on. After a tree is six or seven years old it is almost certain to mildew.

GOOSEBERRY MILDEW AND APPLE SPOT.

The Secretary.— Regarding the gooseberry mildew to which the Ven. Archdeacon has referred, I may say that I have been studying very carefully the reports of the United States Experimental Stations, at which a series of careful experiments have been in progress connected with mildew and other fungoid diseases, and I believe that means will be found of stopping mildew without having recourse to cutting down the bushes or destroying them. Experiments are being made with copper solutions, which are found successful in combatting fungi, and one of them, which is being very successfully applied to apple spot, I hope may also prove useful for mildew, that is the ammoniacal carbonate of copper. It is prepared in this way : an ounce of copper carbonate precipitate is dissolved in a quart of ammonia and diluted with twenty-five gallons of water. I think we should keep careful track of these remedies and try them ourselves. I am this year trying this ammoniacal solution of carbonate of copper for apple spot and I think I observe some benefit from it already, although I did not begin so early in the season as I ought to have done. It should be applied before the buds open at all for apple scab, and also, of course very early for mildew, because these fungi live through the winter in some way and the action of these copper solutions is preventive rather than curative. The reason I did not apply it as early as would have been desirable was that our local druggist did not keep it in stock, it being an article not in demand at present and it was not until after a good deal of urging that he wrote to a wholesale druggist and succeeded in procuring it.

Mr. BUCKE.—That is for the apple spot.

The SECRETARY.—Yes. Hypo-sulphite of soda has been rccommended and has been used by some with success, but it is not nearly so effective as this carbonate of copper. The only difficulty with the carbonate of copper is that the ammonia renders it soluble, and we have to spray our trees with Paris green as well, which makes extra work. If some way could be devised of using the copper carbonate and Paris green together it would save labor, but unless the ammonia can be dispensed with it cannot be done. because it makes the Paris green too injurious to the foliage.

Mr. CRAIG.—At the Experimental Farm some work was tried in the same line with the Paris green and the carbonate of copper without ammonia to see if there was any beneficial effect, and with carbonate of copper alone and in suspension. I find that in water it will remain in suspension as well as Paris green, so it is possible it may be used without ammonia as a solvent. If, as the secretary has suggested, we can get a combined insecticide and fungicide it will be a very valuable acquisition. The carbonate of copper costs about sixty cents per pound in the precipitated form. Large trees will take from one to three gallons to do them fairly, that is of the mixture with Paris green.

Mr. BUCKE.—That amount of the stuff would make a very large quantity of the mixture.

Mr. CRAIG.—Yes. We have used a different strength from that mentioned by Mr. Woolverton ; I have used it from one to three ounces and at the rate of twenty-two gallons. I do not think there is any doubt we will be able to get some results which can be followed up next year.

The SECRETARY.—As this is an interesting topic I do not think it out of place to follow it up. I would like to add that I have been applying it to the pear as well. This year the Flemish Beautys are horrible, covered with scabs and curling up in every shape on the side in which the scab has affected them and are certainly going to be utterly worthless. Of course it was too late with them ; I could not get it in time to apply early enough, but I really think I see some results from its application after the scab made its appearance. I have tried it on pear trees standing side by side, applying it to one and not touching the next and I think I can see a difference. I have not tried the sulphate of copper alone.

Mr. CRAIG.—I was very much surprised to find that applied in the proportions given at Washington it injured the leaves.

Archdeacon MCMURRAY.—Would it not be well also to give us the proportions in which Paris green and other chemicals should be applied.

The SECRETARY.—The quantity of Paris green that it is safe to apply is about three ounces to fifty gallons of water. I think that is quite as strong as we dare use it, and about two ounces of the carbonate of copper to fifty gollons, mixed with the other. If you use the carbonate of copper without the ammonia, it, being a powder, can be used with the Paris green.

Mr. BEALL.—You mean adding one powder to the other with the one quantity of water—fifty gallons ?

The SECRETARY.—Yes. The two of them in solution with water. Take a barrel that holds fifty gallons and put in three ounces of Paris green and two ounces of the copper. Even with that strength I have often found that I have injured the foliage, but that, I think, is because I stopped too long at a tree and sprayed it too heavily, for I think too much can be put on in that way.

Mr. A. C. BILLUPS.—What effect has the Paris green upon the leaves ?

The SECRETARY.—They look as if burned, and then drop.

Mr. BILLUPS.—Have you noticed that the carbonate of copper has any effect upon the curculio when used without the Paris green ?

The SECRETARY.—I do not know whether it would or not, not having experimented in that line.

A MEMBER.—Do you find any difference between the solution made with ammonia and the suspended solution?

The SECRETARY.—I have not experimented long enough to be able to say.

Mr. BEALL.—The rev. gentleman here, spoke of cutting up a large number of bushes. I hope he destroyed them.

Archdeacon MCMURRAY.—I destroyed them.

Mr. MORRIS.—It is my opinion that mildew in gooseberries is caused by cold nights and warm days. This season we have been comparatively feee from cold nights, which, I think has had a good deal to do with it.

Mr. BEALL.—I may say we had cold nights and hot days similar to other years: there has been only a very slight difference in the maximum temperature of this and other years.

Mr. T. H. RACE (Mitchell).—My theory is, and I will always adhere to it, that nature's methods are more perfect than those of man, and if nature is not obstructed in her operations she generally attains perfection. I attribute my success in gooseberry culture to a free circulation of air, plenty of sunlight and the application of ashes to the soil. I have had no mildew for years, but you will not find another garden in the town in which I live in which there is not mildew. When I say ashes of course I mean hardwood ashes. I have about 200 bushes of Whitesmith, and I have Crown Bob and Industry, which are my leading varieties, and I defy any man to come into my place and find a single case of mildew. The Whitesmith I have seven years, the Industry four years and the Crown Bob two years. I apply ashes very heavily, which is the only fertiliser I give them. There is just one other thing on which I would like to ask an opinion. Five years ago I had a row of Whitesmith gooseberries, about 30 in a row. I wanted to manure them very heavily and I wheeled out fresh manure from the horse stables and dug it in very heavily about half the length of the row, and the remainder I manured very heavily from the cow stable. A few weeks afterward I noticed a rank, fungous growth on the ground manured from the horse stable and the bushes immediately above that mildewed, while there was no indication of mildew at all on that part manured from the cow stable.

Archdeacon MCMURRAY.—What quantity of ashes do you apply?

Mr. RACE.—My Whitesmiths are planted five feet apart in a row, and I started with ashes by putting a pailful of ashes between every two bushes. That was a pretty heavy application but I saw good results from it, and every year after I applied about half that quantity.

Mr. MORDEN.—My theory is that the fresh horse manure injured the roots of the plants spoken of by Mr. Race and therefore the fungus could take effect the more readily upon them. Manure from a horse stable, applied in large quantities, will injure almost any tree or plant except corn, which will stand a good quantity. As an illustration of this, I put a hot-bed within ten feet of a large black cherry tree, at least ten inches in diameter and it was within twenty feet of a mountain ash and that hot-bed killed them both. I have wheeled out stable manure and laid it on an open space where some gooseberry bushes got broken down and I found that the bushes on each side were materially injured by nothing else than the heating of the manure.

Mr. RACE.—The condition that induces mildew is in the plant?

Mr. MORDEN.—Yes. I believe a healthy plant has a greater resisting power than a feeble one.

Archdeacon MCMURRAY.—I thought the condition which induced mildew was a humid atmosphere.

Mr. MORDEN.—Yes; but what I mean is this, that a healthy plant has greater powers of resistance; it will not be attacked so quickly nor to the same extent as a sickly plant would be. A plant in which a rank and rapid growth is induced is not in a healthy tate.

Mr. Race.—I think the horse manure produces mildew by a condition in the atmosphere arising from gases of some kind.

Mr. Morris.—I think Mr. Morden is right, and that too much manure will induce an unhealthy growth; but ashes, on the other hand, while it produces a strong growth produces healthy wood. I have had a good deal of experience in the use of ashes and I think their use makes a strong, healthy bush, able to withstand the attacks of mildew. I know that a pear tree with ashes is not nearly so liable to blight as one with manure.

Mr. Bucke.—I think if Mr. Race had applied the manure in a rotten state the result would have been different. I have never yet succeeded in killing gooseberries with old, rotten manure.

THE CURCULIO.

Archdeacon McMurray.—Regarding the curculio, I was very anxious to know how long it would remain after the fruit falls from the tree, how long it would be before the young curculio makes its appearance. I asked the question and was told not more than four or five days. I had no idea it would come out so quickly as that; I thought a fortnight or three weeks.

Mr. Billups.—In reference to the curculio leaving plums, I find that under various circumstances they leave at different times. I have noticed that in mild, warm, still days the plum does not generally fall until relieved. In that case the curculio leaves sooner than if the plum had been blown off by a storm, in which case it remains for some time. I would like to know if anyone who has studied the matter can tell definitely the average time the larva takes, after the plum has fallen, before it enters the ground.

The Secretary.—I do not think anyone present can answer that.

Mr. Billups.—I think it is one of the few things Prof. Saunders has failed to mention. I think if farmers would only take the trouble to gather the fallen plums at intervals of two or three days and destroying them it would do much good not only with plums but with cherries. I have found in several instances this summer that over 90 per cent. of the cherries have been bitten by the curculio.

The Secretary.—I have been experimenting with hellebore in water and spraying cherry and plum trees, part of them with it and part with Paris green, and I am certain I had better results with the hellebore than with the Paris green, that is from one season's experience. The proportions were the same as we used for the currant worm. The cherry trees upon which I tried it are free from curculio, but unfortunately they are rotting badly.

Mr. Billups.—The use of Paris green is very unsatisfactory indeed. I have never seen any experiments with hellebore, but I do not think it could well be less satisfactory than Paris green. The dose of Paris green people here use is a teaspoonful to five quart pails. I think that it is a very heavy dose, and though, in my experience it has not injured the foliage at all it is not at all satisfactory.

The Secretary.—I think one reason is that it is not used early enough.

Mr. Billups.—I may say also that I think it is not applied late enough.

Archdeacon McMurray.—Is there any way of reaching the curculio after it has fallen and reached the ground? Would not some alkali thrown around as far as the limbs extend be of some benefit?

Mr. Billups.—I do not think it would have any effect; as so soon as the chrysalis has reached the open in the spring the curculio gives off a perfect insect, ready for work. I do not know that it eats very much; once the curculio comes from the chrysalis its only object in life is to lay its eggs and then it dies. I do not think that any alkaline poison around the ground would have any effect. Indeed I may say I do not know that Paris green itself actually kills the curculio; I think it possibly finds there something unpleasant on the plum and therefore leaves it. I believe that sprinkling with some kind of ashes or cinders would be almost as efficacious as Paris green. I think Paris green acts more as a mechanical barrier than as a poison. I mean that the curculio reaches the plum and finds it is covered with a rough substance and leaves it. I do not believe it eats the poison and suffers thereby, but I believe it merely leaves the tree.

The Secretary.—Do you not think it eats the leaves that are poisoned ?

Mr. Billups.—I do not think so.

The Secretary.—It has been found by confining the curculio in a box that it will eat plum leaves.

Mr. Billups.—I have found the curculio eating paper, sawdust and many other things too ; they are very fond of destroying things.

A Member.—What do you think they feed on ?

Mr. Billups.—I think the curculio has very little need of feeding ; I think all the feeding is done in the larval state. They will live six or eight months without eating.

The Member.—Well, I do not agree with that. Can you account for the numerous holes in the plum leaves ?

Mr. Billups.—I think the insects are trying to find a place to lay their eggs.

Mr. Pettit.—Have you noticed any difference in different grades of Paris green with regard to its dissolving in water ?

Mr. Billups.—No ; I did not know that Paris green would dissolve at all ; I thought it was merely a suspended solution.

The Secretary.—You are correct in that, but perhaps the gentleman may mean that some grades are heavier than others.

A Member.—With some the water will remain clear and with others the water is green. With some grades the particles are large and with others small.

Mr. Billups.—That is because of some glutinous matter in the Paris green which sets together the grains, and that glutinous matter would not be dissolved by cold water, but I do not think that either hot or cold water will give a chemical solution of Paris green.

A Member.—How do you account for potato bugs being poisoned ?

Mr. Billups.—If you notice the leaf of the plum tree or potato you will notice a well defined mark of the Paris green. In a chemical solution it is combined with the water, in a suspensory solution the water evaporates. The only object of mixing Paris green with water is to secure its even distribution over a large area. If it is necessary to have a chemical solution the use of ammonia is requisite.

The President.—We have a gentleman here, Mr. Morden, who knows something of chemistry : perhaps he can tell us something about this matter.

Mr. Morden.—It is generally understood that Paris green is not soluble in water. This year I used Paris green for the currant worm for which I had previously applied hellebore. I dissolved the paris green in ammonia and applied it at the rate of a teaspoonful of Paris green to five gallons of water, just half the strength. I have been in the habit of applying it in the suspended state and I had good result. In the suspended solution it settles in drops on the surface of the leaf, and a considerable portion of the Paris green settles in that particular drop, just as in a pail of water, and it consequently cannot be as effective, because the insect may traverse a considerable portion of the leaf before it reaches that part. I am so much satisfied with the results that next year I am going to apply no hellebore at all, but the ammoniacal solution of Paris green.

Mr. Craig.—I fancy the reason you find greater effect from the ammoniacal solution is owing to the fact that more of the Paris green is brought into contact with the leaves than there would be in a suspended solution.

Mr. Morden.—Ammonia is one of the best tests of Paris green we have. Pure Paris green will dissolve without sediment, but there is no pure Paris green on the market. I would not object to a small quantity of sediment, but I do not think there should be over one-tenth.

Mr. Bucke.—How do you mix the two together?

Mr. Morden.—I take a little Paris green and pour it in a flat vessel, moistening it with water before putting in the ammonia, because there is sometimes a little mucilaginous matter at the bottom and you can then get a better solution with the ammonia. The solution is a bluish green.

Mr. Beall.—I intended this spring to have used the ammoniacal solution spoken of for mildew on gooseberry bushes, with which I have been a good deal troubled and had I done so I should have no doubt said it succeeded admirably, because this year I have not had one particle of mildew in any variety; but I made only one very slight application of Paris green. The point I want to make is that we should not jump at conclusions too soon after making an experiment; it is something which requires a long experience and extended observation and the results should be ascertained very carefully and accurately.

THE APPLE SCAB.

The following paper on this subject was afterwards contributed by Mr. D. W. Beadle, of St. Catharines:

Much loss has been sustained by the injuries caused by this fungus to many of our most popular apples, notably to the Snow apple, Northern Spy, Early Harvest, and others. The late John Croil stated that the loss to him was so serious as to amount to thousands of dollars. In former volumes of the Canadian Horticulturist attention was drawn to some experiments made with hypo-sulphite of soda which gave promise of our finding in that fungicide a remedy. Since then experiments have been made with other substances known to possess fungus destroying properties. An account is given in the bulletin of the Agricultural Experiment Station, of the State of Michigan, for April, 1890, of some experiments made there by Mr. L. R. Taft, the horticulturist, the substance of which cannot fail to be deeply interesting to all of our orchardists.

Twelve trees of the Northern Spy were chosen as the subjects of these experiments. The fungicides used were the following: (1) Potassium sulphide, but which of the sulphides is not stated; (2) sodium hyposulphite; (3) a sulphur solution; (4) copper carbonate and ammonia; (5) modified eau celeste, composed of copper sulphate, carbonate of soda and ammonia. Copper sulphate is popularly known as blue vitriol. Two trees each were sprayed with one of these five fungicides, and two were not sprayed at all. The spraying was done with the little climax pump made by the Nixon Nozzle and Machine Co., Drayton, Ohio. Care was taken to cover every leaf and fruit with a fine mist-like spray, using about three gallons to each tree. The time occupied was about ten minutes to a tree, but the report states that with a large Nixon or field pump not over three minutes would be needed for spraying a tree. The applications were first made on the 24th of May, 1889, and the second on June 6th, at which date there was no appearance of scab on the fruit, nor of injury to the foliage from any of the fungicides. On June 12th a third application was made, and at this time there was no appearance of scab or of injury from the use of the chemicals. The fourth spraying was given on the 25th of June, and now the scab was visible on both the fruit and leaves of all the trees, also the leaves of the two trees sprayed with sodium hyposulphite were turning brown at the edges. July 6th the trees were sprayed a fifth time. At this and subsequent applications of the sodium hyposulphite the strength was reduced by the addition of two more gallons of water, and no further injury to the foliage was perceived. A sixth spraying was given July 24th when a slight increase was noticed in the size of the spots, and but very few new scab spots could be found. The seventh and last application was made August 1st, at which time no new spots were forming, and the spots that had formed were not spreading.

There were frequent rains during the period covered by these experiments. Rain fell on May 29th and continued at intervals until June 4th, falling again on the night of June 6th and continuing lightly for the two following days, with frequent showers up to June 25th. There was no rain from that date until the 14th of July, but a steady rain set in on that day, lasting through the 15th, succeeded by several heavy showers between that and August 1st. All of the solutions except the two containing copper, Nos. 4 and 5, were easily washed off.

Early in October the apples were gathered and assorted into three classes, those entirely free from scab, those slightly, and the badly scabby. The apples in each class were then counted and weighed, with the following result: The trees sprayed with potassium sulphide yielded 1,944 apples free from scab, weighing 441½ ℔; 5,659 were slightly scabby, weighing 1,171¾ ℔; 15 were bady scabby, weighing 2 ℔; that is 25.5 per cent. were free, 74.3 per cent. slightly scabby, and 0.2 per cent. badly scabby. With sodium hypo-sulphite 1,715 were free, weighing 419¾ ℔; 5,484 slightly scabby, weighing 1,218¾ ℔; 65 badly scabby, weighing 10½ ℔; or 23.6 per cent. free, 75.4 per cent. slightly, and 0.89 per cent. badly scabby. With the sulphur solution 1,010 were free, weighing 278 ℔; 4,643 slightly, weighing 1,146¾ ℔; 65 badly scabby, weighing 10½ ℔; which is 17.6 free, 81.2 slightly, and 1.1 per cent. badly scabby. Copper carbonate with ammonia give 4,289 free, weighing 1,107¼ ℔; 4,067 slightly scabby, weighing 913½ ℔; 13 badly, weighing 2 ℔; which is 51.2 per cent. free, 48.6 slightly, and 0.16 per cent. badly scabby. The two sprayed with modified eau celeste yielded 3,983 free, weighing 1,174 ℔; 1,178 slightly, weighing 519½ ℔; 11 badly, weighing 2 ℔; or 68.8 per cent. free, 31.0 per cent. slightly, and 0.2 per cent. badly scabby. A marked difference is seen in the product of the two trees not sprayed, of which only 365 apples, weighing 101 ℔ were free from scab; 2,498, weighing 681¾ ℔ were slightly, and 51, weighing 13½ ℔ were badly scabby; that is, only 12.5 per cent. were clean, 85.7 per cent. were slightly scabby, and 1.8 per cent. badly.

The chemicals used were bought at the drug store in small quantities, costing as follows: Potassium sulphide 40 cents per ℔, sodium hyposulphite 6 cents, copper carbonate 60 cents, copper sulphate 10 cents, sodium carbonate 5 cents, and ammonia 35 cents a quart. At these prices the cost of five applications per tree, including labor, was for potassium sulphide 20c., sodium hyposulphite 12½c., copper carbonate and ammonia 25c., modified eau celeste 30c.

The experimenter is of the opinion that if the spring and early summer should be comparatively dry three applications at intervals of four weeks of either of the copper mixtures will be sufficient. If the spring should be cold and wet five sprayings at intervals of every three weeks will be required. When the trees are sprayed just after the blossoms fall for the codlin moth, the fungicide may be added to the solution of Paris green, thereby saving all extra labor in the first application. When large orchards are to be sprayed the chemicals can be purchased at wholesale, thereby effecting a considerable saving in cost of material.

It will be seen that the copper mixtures are by for the most efficacious, therefore passing the others by, we give the formula for preparing these as recommended by Mr. Taft in his very interesting and valuable report.

Copper carbonate and ammonia. Mix three ounces of copper carbonate with one quart of ammonia, and as soon as all action has ceased dilute with water to twenty-eight gallons.

Modified eau celeste. Dissolve two pounds of copper sulphate in hot water; in another vessel dissolve two pounds and a half of carbonate of soda. When both are fully dissolved mix the solutions together. Before using add a pint and a half of ammonia and then dilute to thirty or thirty-two gallons with water.

It will be noticed that the best results were obtained with this last mentioned mixture, and there seems to be good reason to believe that in the case of varieties subject to the scab fully fifty per cent. will be added to the value of the crop by its use.

I am just in receipt of reply from Prof. Taft. He thinks that the ammonia if added to the Paris green just before using would dissolve the arsenic to only a slight extent. He adds however that he feels like recommending the following formula for the first two applications, viz., dissolve in hot water 2 pounds of sulphate of copper. In another vessel dissolve 2 ℔ of carbonate of soda; mix in a tub; after all action has ceased dilute to 32 gallons. There would be no danger of dissolving the arsenic by adding this to the Paris green. He believes, however, that the copper solution alone will have sufficient poison-ing effect to destroy the codlin worm. If that be the case, the Paris green can be omitted altogether. In the last two or three applications he would add the ammonia to the copper and soda as prescribed in the formula given in my paper. (See report 1890). He further says that if this copper mixture is applied early enough and occasionally repeated, it will prevent both mildews of the grape. With reference to the curculio he says, "From what I have seen of the use of hellebore I consider it fully as effectual" as the arsenites.

POINTS IN PEACH GROWING IN THE NIAGARA DISTRICT.

The Secretary, Mr. L. Woolverton, of Grimsby, read the following paper on this subject:

After the good success which has been the fortune of peach growers in this immediate neighborhood of late and the failures which have been our lot in other sections of the Niagara peninsula, it ill becomes a Grimsby man to come here to speak upon this subject. I will not inflict upon you a lengthy paper but only mention a few points which may lead on to a discussion of this subject.

After some twenty years of experience in peach growing, during which time the failures far outnumber the successes, I am still of the opinion that it pays us in this region to grow peaches for profit. Even if we only get one good crop in five years, and that is no worse than our luck sometimes has been, the peach is still worthy of a place on our fruit farms. A good yield will sometimes pay the owner as much as $200 per acre, and this gives an average of $40 per acre for five years, supposing he is that unfortunate, while at the same time he is supported by the chance of better things.

Careful attention to a few points will go a good way toward making peach growing profitable. One is, of course a wise selection of varieties. Our president recommended, at our last winter meeting, the following as his choice of six for profit: Alexander, Early Rivers, Hales, Crawford's Early, Wager, Bowslaugh's Late. These are excellent; but I am becoming more and more discouraged with the Early Crawford. This season, for instance, when I have a fair show of others in the orchard there are no Crawfords. Last year it was the same, and indeed this so often happens that it has become almost the rule. Now when we get this peach it is so fine that we feel as if we wanted to grow no other, but we do not get it and we must choose between no fruit or fruit of a less desirable quality. Our American friends, at the last meeting of the N. Y. State Horticultural Society, stated that two varieties lately tested by them had been found to be reliable bearers, viz.: Hynes' Surprise, and Horton Rivers. The latter is a seedling of the Early Rivers and possesses many of the exeellencies of that very desirable variety. We have also some seedlings of Canadian origin which seem to promise well; as, for instance, one originating at Chatham, with a Mr. Scott, one at St. Catharines with our president, and the one mentioned above, which originated at Grimsby with Mr. Bowslaugh.

I have tried many other kinds besides the above mentioned but nearly all have some fault. I will mention among them the following, viz.: Early Purple, Early York, Royal George, Sweet Water, Honest John, Early Barnard, Early Beatrice, Early Louise, Oldmixon, Jacques Rareripe, Late Crawford, Morris White, Lemon Cling and Smock

In addition to these, I have now under testing, among others, the following: Troth's Early, Christiana, Saiway, Steven's Rareripe, Wheatland, Willet's, Conkling, Cooledge's Favorite, Foster, Hill's Chili, Lord Palmerston, May's Choice, Mountain Rose, Richmond, Salway, Schumaker, Pineapple, Globe and Centennial.

While I hope that of these latter I may find some of sufficient value to be placed on a list of the six best kinds when I report next to you, I am loth to leave out one or two in the former list, as *e.g.* the Oldmixon, one of the grandest old varieties, both in quality and appearance that I have cultivated; but it is tender, and worse than all it seems to be peculiarly subject to the yellows. The Smock, too, is a variety that I have highly valued as a late variety, but I believe its place will be better supplied by the Steven's Rareripe.

Another very important point in peach growing is the selection of a suitable site and congenial soil, for the peach is very hard to please in this respect. It demands, for best results, a well drained sand loam or gravelly soil. I have tried orchards on sand, clay loam, sandy loam, both high and low, but my best orchard is on an elevated piece of ground of about five acres in extent. On other parts the trees have been short-lived and unsatisfactory, especially on the clay loam.

I am in favor of rather close planting of the peach trees on account of their liability to die of yellows at an early age. If our trees lived, now as they did in the days of our fathers, when it was not uncommon to meet with orchards twenty-five or thirty years planted, then a distance of twenty feet would be needed; but as it is I am inclined to plant at about twelve feet apart.

The method of pruning has much to do with deciding the distance of planting. If the limbs are allowed to grow to any length, spreading out like bare poles, with foliage and fruit far out towards the ends, certainly close planting would not answer. But this method of pruning is out of date in Canada, even trees so treated die early, and are not so productive as when properly shortened in. Of late years I have become more and more convinced of the great importance of the shortening in system of pruning the peach tree, and every year practice it to a greater extent. The idea is simply to cut back the new growth about one-half every spring; and in case of neglected orchards which have already become straggling, to cut back the old wood severely; and in this way an abundant supply of young wood is kept up which is productive of better fruit and a greater abundance of it. An orchard so treated will also live longer and be more attractive in appearance.

The peach orchard must have thorough cultivation, especially in the early part of the season. I usually plow twice in the early part of the season, and then cease cultivation, in order that the wood may mature well before the cold weather.

The peach has its share of enemies and diseases, chief among which are the curl, the curculio, the borer and the yellows. For the curl I know of no remedy. It is not often severe, but sometimes with the diseased leaves the fruit also drops. I have little difficulty with the borer. I always heap up my trees with earth in the spring and when Mr. Egeria exitiosa, as the entomologists call him, attempts to get a place in the tender part at the collar of the tree he finds he is blocked out by the earth. The Yellows is still as great a mystery as ever, notwithstanding the enormous expense incurred by the Department of Agriculture of the U. S. in trying to understand it. I have looked carefully through the report on the subject faithfully and elaborately prepared by Prof. Erwin Smith, but can find no better method of eradicating this scourge than the one which you and I have been faithfully employing for years past, and that is, rooting out every case as soon as discovered.

Prof. Burrill, of Champagne, Ill., the discoverer of the microbes which cause the pear to blight, called on me last year. He showed me through his powerful microscope the microbe accompanying the yellows, but he said that its mode of operation was still a mystery, and he could not yet say whether it was the cause of the disease or an accompaniment of the unhealthy conditions.

Packages and packing are important in the handling of a crop. The old bushel crate has entirely passed out of use with us in Canada. The half bushel and basket has given place to a twelve quart basket, and now the question is whether this is not too large. I intend to use, for choice samples during the growing season, the ten-pound grape basket, putting only the finest in this package and the ordinary in a larger package; but I shall weary you, gentlemen, if I go into details in matters concerning which you have as much experience as I have.

I only hope that the difficulties in respect to hardy varieties of merit and of insect enemies and fungus diseases may be so far overcome that peach culture in this favored peninsula may take the place it should among our most profitable industries.

Archdeacon McMurray.—Are you troubled any with borers? A number of years ago I planted seventy trees from Ohio, and those worms destroyed all my trees.

The Secretary.—I have been troubled with them, but not so much of late. I presume that the trees you got from Ohio had the borers in them, and as you did not notice them and did not get them out they destroyed the trees. If the borer is in the orchard the only way is to go with a knife, and wherever you see any castings or wax oozing from the root you may be sure there is a borer, and by removing a little earth you will soon find a hollow place in the bark, and can easily find the larva of this borer and destroy it. This should be done every summer. But I have been very successful with the method I have described in the paper; that is, by going over my peach orchard early in June and heaping up the trees with earth. It takes very little time and where the orchard has been plowed up it is very little trouble to heap a mound of earth around every tree, and that will effectually keep out the borer, because the moth deposits the egg at the collar of the tree. If it deposits it higher the bark is too dry and it is not likely the borer will hatch out, and if it does it will not do any great mischief. I leave these mounds there during the summer; the moth deposits its eggs during June, July and August, and it is during those months the protection is needed.

Mr. Nichol.—Is that a distinct insect from the apple borer?

The Secretary.—Yes. The peach borer, I believe, will live sometimes two years, but generally only one; it will remain in the tree from one to two years before it transforms into a chrysalis. The parent of a peach borer is a moth; the apple tree borer is a beetle.

Mr. Morris.—I quite agree with the paper read by the secretary, with the exception of what he says as to varieties. I do not think he has mentioned the most profitable ones at all, that is Wager and Mountain Rose. I agree with him as far as the Early Crawfords are concerned. I have planted five thousand of them in my time, but would not now plant another. I do not think, as the secretary has said, that too much can be said in favor of early cultivation; the only orchards having any fruit this year, that I have seen, are those which have been early cultivated.

Mr. Service.—Which is the most successful, the yellow or the white?

The Secretary.—I think, as a rule, I have got more fruit from the white fleshed, but with the exception of one variety, the Wager, I have not tried it sufficiently long to say much about it. Last year it was a most abundant bearer.

Mr. Nichol.—I have found coal ashes very valuable, not only for the borer; it is an excellent mulch for young fruit trees, and is a protection against drouth and mice. I have applied it heavily, and although there is no fertilising matter in it I have seen no bad effects from it.

Mr. Morris.—I would ask the secretary if he does not think trees with long trunks are more subject to disease and borers than short stemmed ones?

The Secretary.—I do not know whether it has any effect as far as the borer is concerned, but I am strongly in favor of low-headed peach trees and keeping them down pretty low. I believe in low trees in the first place, and I keep them down afterwards by constantly cutting them back. I think a very great mistake is made in the method of pruning peach trees all through this section of the country. It is not only the trunk, but all the limbs from the trunk are bare for so many feet; you have just tufts of branches away out at the ends of these limbs, and as a result there is very little new growth from such pruning, and the trees very soon die of old age. I know that is the great fault of the growers at Grimsby. I do not think the trees are so productive as when kept down. The object of the borer, of course, is to get into the root, and as long as we have heap of earth or anything to prevent his finding his way to the root of the tree I do not think would much matter about the height of the tree.

Mr. Billups.—Do you think the mound of earth prevents them?

The Secretary.—It prevents their reaching the spot they want to get to.

Mr. Billups.—Don't you think it has often an opposite effect—that it harbors them?

The Secretary.—You must be careful to take out any borers before you put the earth around about the trees. If they have been exposed during the season the borer ought to be dug out in the autumn or early spring and the trees then banked up and left so during June, July and August, when the moth is flying around seeking a place to deposit it eggs.

A Member.—How do you cultivate low-headed trees?

The Secretary.—I manage to get quite near them. I suppose the trunk will be two and a half or three feet from the ground, and then by keeping them well cut back the branches get bushy and you can get pretty close to them, especially if your harness is adapted for the work.

Mr. Billups.—Is it an established fact that the moth of the borer places the eggs upon the stem of the tree or in the earth surrounding the tree. In the little experience I have had I have generally found the borer a little below the surface of the ground. The moth certainly cannot find its way under the ground to deposit its eggs.

The Secretary.—I think, though I won't say positively, that it is deposited in the tender bark near the surface of the earth, where the root begins, but I have noticed that when the larva becomes full grown it emerges from the tree and transforms in the castings outside.

FRUIT CULTURE IN THE NIAGARA DISTRICT.

The President.—I find on the programe for discussion the following question: "Is fruit culture on the increase or the decrease in the Niagara District, and is fruit growing more profitable than grain and root crops, taking into consideration the large amount of labor, attention and fertilisers required for the fruit crop, the insect enemies, off years of bearing, etc?"

Mr. Courneen.—There is no doubt that fruit culture is on the increase.

Mr. Ball.—Last year there was more fruit shipped from the township of Niagara than from the next two counties to it.

Archdeacon McMurray.—There have been tens of thousand of peach trees put out this spring within three or four miles of this place.

The President.—The fact that it is on the increase may be taken as an indication that it is more profitable, but the question is whether it is more profitable when the amount of labor expended and the losses of one kind or other are taken into consideration.

Mr. Ball.—A few years ago all you could get for land here was $50 per acre, but now no person would think of asking less than $100 per acre or over for land suited for fruit culture.

Mr. Morris.—The planting of fruit is very much on the increase every year.

Mr. Nelles.—I think it pays. We have a very fair crop every year. This is the first year we have missed having an average crop, and this spring we felt sure of having an immense crop.

The Secretary.—What do you reckon is the average profit of an acre of peaches?

Mr. Nelles.—I have not figured it down that fine.

Mr. Morris.—We have an orchard of four acres of peaches, all the varieties we can get hold of, and one year we had $1,500 off that four acres. If the peaches had all been of one profitable variety we would have made three times as much as that, for many of the varieties did not pay anything at all. That orchard is about five years old. It is true that it has not since produced anything so good, but I think this year it is going to do fully as well.

Archdeacon **McMurray.**—I am told that $1,500 off four acres, clearing $1,200 profit, is what Mr. Carnochan did. I myself had one tree from which we took eighteen baskets, besides four that were destroyed.

The **Secretary.**—I think we ought also to look at the other side. I have planted several orchards, from some of which I have never had a crop; that is the reverse of the shield. My cousin, on the next farm, certainly did reap one enormous crop from ten acres of peaches, from which he got $3,000, but he never got another like it; I think it was the first and the last real good crop. I do not think, on the average, peach culture pays any better than any other kind of fruit growing. I think it is hardly wise to let these glowing statements go out without some little qualification.

THE SUITABILITY OF ORNAMENTAL TREES.

At the opening of the meeting on Wednesday morning Mr. D. Nichol, of Cataraqui, read the following paper:

In the eastern and northern parts of Ontario there are annually expended thousands of dollars for ornamental as well as for fruit trees, which to the purchaser are worthless. I think most of you are quite familiar with this fact. No doubt this subject has often been discussed at previous meetings of this kind, but still the evil continues increasingly. Travelling tree agents, as a class, are not men of practical experience, consequently they cannot be supposed to possess a correct knowledge of the requirements of the dwellers in the various localities. In this locality you can grow many trees which cannot be successfully grown in by far the greater part of Ontario. Each succeeding generation of farmers in the colder districts goes through the same expensive experience, and the probability is that so long as only about one in fifty read a horticultural or an agricultural journal, so long will they continue to be imposed upon, unless some means can be devised for preventing the imposition.

I do not pretend to have discovered a remedy, but would merely enunciate some ideas gleaned from observation and a long practical experience which may lead to a discussion that may perchance be profitable to some.

According to the programme I am also to speak of some mistakes which are made concerning ornamental trees. I will not undertake to tell you all the mistakes I have made myself because some mistakes I have made in this matter were so stupid I would be ashamed to tell you of them; so I will briefly notice only a few things, without using any technical names.

Although the catalpa, tulip-tree, Kentucky coffee-tree, the magnolias, the cypress, ailanthus, laburnum, enonymus, buttonwood, persimmon and sassaffras are not suitable for our northern climate, there is certainly no lack of variety of beautiful trees which can be relied on as being hardy enough and in every way suitable for any inhabited part of Ontario. Among evergreens we have the hemlock spruce, which for gracefulness of habit and richness in color of foliage is not excelled by any foreign variety that I know of. I often wonder why it is so seldom planted and grown as an ornamental tree. Perhaps by some it may be considered too common, but that is a mistake, for, according to present indications, it will soon become one of the most uncommon trees in this country. We have also the Norway spruce, the black, white and blue spruce, the balsam fir, arborvitaes in great variety, red cedar and the retinispora, the Austrian pine, Scotch pine, Weymouth pine and a lot of other pines, which, when grown as single specimens with plenty of room make beautiful ornamental trees. Then among deciduous trees, besides all the glorious maples, elms, ashes and mountain ashes, we have the basswood, European larch, European white birch, American canoe birch, purple birch and the cut-leafed weeping birch. Trees of all these kinds, when properly grown as single specimens, are admirable.

One prevailing error in regard to this matter is planting trees too closely together wherever they are planted. Not long ago I saw growing on a lawn in front of a house three beautiful trees of considerable size; one each of the purple beech, cut-leaf maple and weeping birch. They were only twelve feet apart and beginning to crowd each other, consequently in about three more years the two outer ones will be lop sided and the middle one a spindling scrub. I have seen thousands of fine trees ruined in the same way. Indeed it is only in rare instances they are given sufficient room to display their natural beauty. I speak only of ornamental trees and will not encroach on forestry, at least, on this occasion.

Another objectionable practice is that of clipping or trimming evergreen trees into various fanciful shapes. When trees are grown for ornament and given plenty of room they usually take a natural and graceful form, which is always more pleasing to those who have acquired a correct taste than any distortion that may be given by pruning. I have known some otherwise beautiful landscapes sadly marred by the stiff appearance of some barbered trees.

Another common mistake is made in giving preference to all foreign species belonging to the same genera as some of our native trees. The European larch is of more graceful habit than our native tamarack, and the white birch, with its weeping varieties, is certainly more beautiful than any of our common birches ; but the European linden is not by any means preferable to our basswood as an ornamental tree, neither is the English elm for beauty or for shade to be compared with some of the varieties of our own white elm. Particularly is this noticeable on some of the streets in Toronto where the different species are growing on opposite sides of the street. The horse chestnut is a magnificent tree when grown to perfection, but in my district it is too short-lived ; even if it lives for 30 or 40 years it loses its beauty when branches begin to die.

There is perhaps no tree more unsuitable for ornamentation than the silver poplar, (Chinese abele,) yet about many farm houses it is the only tree planted. When once planted it is there to stay, for it continuously sends up suckers enough to destroy every other kind of tree near by. The down it throws off, after flowering, is an abomination. The Lombardy poplar is admired by some, but it deserves no place on ornamental grounds. Whoever will plant poplars let them plant the aspen ; it possesses some beauty, but it would be folly to plant it unless for the sake of variety.

When asked which of all trees I prefer for the ornamentation of a lawn I invariably recommend the cut-leafed weeping birch. I have lost many fine specimens of it through the depredations of the sap-sucker, (yellow-bellied woodpecker) yet if I had but room for one ornamental tree I would plant this one. Next I would prefer the purple birch, Weiss' cut-leafed maple, European larch, red cedar, blue spruce and Norway spruce ; after that the European mountain ash, the Imperial cut-leafed alder, the basswood and the dogwood. On extensive grounds I would of course plant a large variety and would include the yellow locust. The only objection to it is its tendency to send up suckers. The sweet perfume from its flowers in the month of June entitles it to a place on the pleasure grounds.

The wild black cherry is seldom planted as an ornamental tree although it is remarkably suitable for the purpose. It is beautiful in flower as well as in fruit. I have never seen it affected by the black knot, but have found it to be one of the most enduring.

The hickories, as a class, are of slow growth while young, but their foliage is exceedingly beautiful. In exposed positions they endure and thrive well, while many other kinds would be injured. The ash-leafed maple is quite as hardy but it requires a richer and moister soil. For a large growing, wide spreading tree for shade the common birch is unsurpassed. The white ash, when grown as a single specimen with plenty of room, is a noble tree, well suited for an extensive landscape.

Many others might be added, but I fear I have already occupied too much of your valuable time. I have mentioned nearly all the most beautiful of our native species, at least a sufficient number to make any country home as cheerful and beautiful as the most refined taste could desire. I believe one of the chief reasons why so many farmer's homes look desolate is because the owners have become discouraged through the imposition of unscrupulous vendors who have urged the purchase and planting of trees utterly unsuitable for locality and conditions. Nurserymen who allow their agents to sell unsuitable trees are also blamable and they make a mistake, because success with suitable trees would certainly lead to increased demand. I have been selling trees for 35 years and by selling some which I only supposed to be suitable have been frequently required to make retribution or be branded as a rogue. It requires an ordinary lifetime for a man to learn by experience the suitability of trees which are not indigenous to this country; hence the necessity of being guided by the experience of others. If buyers would take the trouble to inform themselves as to what trees are suitable for their locality and order direct from experienced and reliable nurserymen they would obviate disappointment and the provocation of being swindled.

Mr. MORRIS.—I agree with what has been read in the paper. Regarding the pruning of evergreens, I think they can be sometimes benefited by the use of the knife, not distorting or trimming them into fancy shapes, but shortening a limb here and there where it is required. Ironwood can be made into one of the prettiest of ornamental trees that grows, and it will grow so thick a bird can hardly go through it.

The PRESIDENT.—One or two nurserymen in Rochester make a specialty of ironwood, I think, and even advocate it as a hardy plant.

The SECRETARY.—I think it would be well to hear from Mr. Gilchrist, of Toronto, who is somewhat interested in the varieties of trees adapted for planting in southern Ontario for small ornamental grounds.

Mr. GILCHRIST.—The question has been somewhat sprung upon me, as I did not know what was to be the programme until I saw it this morning. I think I can endorse all that Mr. Nichol has said as to pruning; it is time we had learned to stop it. It may be all right for a man to go to a barber to get shaved, but I do not think the use of the knife improves the appearance of our ornamental trees. Almost everywhere in Toronto it is the same, the natural beauty of the tree is destroyed by pruning. I think we in this society should advocate the leaving of trees in their natural shape and beauty. What is the use of planting a great variety of trees and pruning them all into one shape? There are two kinds of beauty, the symmetrical and the irregular, and we find the trees having the second character, such as birch or elm, the most admired by refined people. I think the blue spruce is the best spruce. It has proved quite hardy at Guelph; and when spruces are selected they have the most beautiful colors. Some are as green as the Norway spruce, while others are almost white. It will not stand the knife, which destroys its symmetrical form. There are four or five varieties of the cornus which are very beautiful, both in the fruit and the flower, and the foliage is always beautiful. I think all the cornuses might be utilised, and also the witch-hazel (*Hamamelis*), which has fine large leaves; it is not a large shrub, but one of the finest we have. But I prefer the American elm to any other tree except the cut-leaved birch. The latter is spoiled by being planted among other trees; it should be planted alone, where it has room to develop, and so that it can be seen from every aspect. The cut-leaved maple is also a very nice tree, but not superior to the cut-leaved birch. Some European trees have better forms than the American; for instance, the birch and some others that might be used to advantage, but I quite agree as to the lindens. Our American linden is another very fine tree, as is also the soft maple where it has room to develop. I think it is very much finer than the hard maple. The horse-chestnut has been planted too closely in Toronto. It is a tree which has seen its best days. In the northern part of the country it has never succeeded, and the money spent on it might better have been spent on native trees. It is very disappointing to pay out $1 per tree for chestnut trees and never have them grow twenty feet high. I know that thousands of dollars have been spent on that tree in the northern part of Ontario. Nurserymen should try to send out trees suitable for the localities they are going to, and should not employ ignorant agents. The time is coming when they will have to be enlightened on these points; there is no use in planting peaches in Muskoka, and it is just the same with planting horse-chestnut trees.

The SECRETARY.—Are there any other trees planted around Toronto that you think are worthless?

Mr. GILCHRIST.—The catalpa does pretty well. It kills back when young, but when it gets older it is a straggling, irregular tree. There are one or two in Guelph about twelve feet high, in sheltered positions. I do not think it is a tree that should be recommended for planting, however. The Association ought to take up the matter, and make out lists of the ornamental trees adapted for different districts. There would be no difficulty at all in doing so, and it would save thousands of dollars to farmers. We have such a variety of climates that a very short distance makes a great difference in trees ; those which may do very well here do not do as well in Toronto or Guelph.

Mr. MORRIS.—In regard to pruning, I think most shrubs, if left unpruned, become as unsightly as old currant bushes. Early blooming shrubs can be trimmed immediately after blooming, and the new growth will bloom the following season ; I think that is the way they should be treated. Many, like althea, will grow into a good shrub without pruning, and of course I do not think they should be cut. I think Mr. Gilchrist is mistaken when he says that spruce cannot be pruned—

Mr. GILCHRIST.—I think they can be pruned but not improved.

Mr. MORRIS.—I differ from you there, again. The proper time to prune Norway spruce is about the 2nd of June. That is for this section. It would be later for the north. Just before they finish making their growth and begin to form the buds, by clipping the sides the buds will form further back. We have a hedge of it that grows about six inches every year, and we prune it the same as any other hedge, and it gets thicker every year ; it is so thick that birds can hardly enter it. Of course I agree with Mr. Gilchrist as to ornamental trees, that they should be cut in only just a little. I would say that all evergreens require a good deal of manure. If they get plenty of food of that kind they will resist the winds on one side a great deal, and for trees that are already in that shape I do not know any other course than to trim off the other side and try to force the growth on that side also. Do the trimming about the latter end of June.

Mr. CRAIG.—I might say that the blue spruce grows very well at Ottawa; the principal trouble is a fungus that appears on the leaves about the 10th of June, and which is very bad now. The leaves are beginning to drop, and it disfigures the tree. This fungus seems to be the principal difficulty, and for it I am now trying the copper solution. Of the cornuses I think one of the most ornamental is the cornus sericea. Another that has not been mentioned is the tamarisk amarensis, which in Ottawa, however, is not quite hardy. Of the viburnums, probably the old English one is the best. Poplars I do not like, on account of the seeds and its sprouting habits. There is one of the American poplars that does not sprout, but I do not think it succeeds in this part of the country. Catalpa speciosa is not satisfactory at all ; it will die the third or fourth year, and I do not think it is worth growing for an ornamental tree. Another tree which I think may be added to the list of hardy ornamental trees is the European larch. Of course it is not an evergreen, but it puts on beautiful foliage in the spring.

HUMBUGS IN HORTICULTURE.

The President announced that Mr. T. H. Race, of Mitchell, Ont., would read a paper on Humbugs in Horticulture.

Mr. RACE.—I have no paper prepared on the subject. I have met many humbugs in my time, and the list is a numerous one, but at the head of it I place the nursery jobber humbug. By that name I wish to indicate the man who claims to be a nurseryman, but who yet has not a foot of ground in the world, nor a single tree to his name. It has been stated here, and often elsewhere, that farmers are a class of people who take a delight in being humbugged ; that they are better satisfied when they are being humbugged than when they are getting a fair deal. But even granting that to be so, the object of this Association is to extend and increase fruit-growing in this province, and I think for that reason it is our duty to protect the farmer from being humbugged, and to educate him up to a point where he will cease to feel any delight in the humbugging process. Our first object, as I have just said, is to extend the growth of fruit and its cultivation throughout the province ; to awaken an interest among farmers as a class in this industry. My experience is that it is not very easy to awaken such an interest in their minds. At present the farmer looks upon his orchard as the most unprofitable part of his farm ; sometimes, indeed, he looks upon it with a certain amount of disgust. He has paid for what he supposed was a certain kind of trees, but after a number of years has discovered that he did not get what he paid for at all, and that his orchard is filled up with a large number of Talman sweets or some even cheaper variety, and, there being no sale for those varieties, his orchard is neglected. I am not a protectionist, but I feel so keenly in this matter that if I were asked to construct a tariff for this province I would have to introduce that principle of protection first of all on fruit trees, on which I would place so high a duty that it would strike the nursery jobber, one that would be prohibitory on his goods. I find that nearly all these so-called nursery jobbers who have been humbugging the farmers, get their supplies from the other side. I have no fault to find with American grown trees, but the nursery jobber will buy his trees where he can get them cheapest, and the nurseryman to whom he goes to purchase them, knowing that he is responsible to the jobber only, and not to the jobber's customers, and that he has to put these trees in at a very low rate, is not likely to give him his best. As a result the nursery jobber fills the orchards of our farmers with the very cheapest trees that are to be had ; it is as a rule the leavings of the nurseryman's other customers that find their way into the hands of the nursery jobber. Therefore the farmer who buys from the nursery jobber runs the risk of getting just whatever the nurseryman has at his disposal at the time the jobber sends his order, and owing in a great degree to this the experience of the farmer is that seven out of every ten trees are a failure. I think that proportion will hold good throughout Canada, for it is based on inquiries I made last fall. When I was talking in this strain before the farmers in many places, I was fallen foul of by these very agents, and I have had some pretty sharp passages at arms with them. Farmers would ask me what nurseryman I would recommend. Now that is not a very pleasant question to deal with, but I always tell them I am not advertising any nurseryman, and mention the names of one or two of our prominent nurseries. Then they want to know how to deal with them to be sure of getting the right varieties, and at reasonable prices. In reply to that I recommend them through their farmers' institutes to make up lists of what they want in fruit trees, and then send their secretary, or some other live man in whom they have confidence, to deal directly with the nurseryman. By this plan I tell them they can get 25 per cent. off the regular list prices, which will pay the expense of sending a man to deal direct. Another question I am asked is, how they are to know these men who represent themselves as nurserymen and not jobbers, and how they can protect themselves. In answer I say that when a farmer wants to build a house, barn or stable, he does not wait until some carpenter comes along and persuades him he needs such a building and takes his order for the material, but he makes up his mind during the winter and begins to make inquiries where he can buy the material best and cheapest, and by whom he can get the work done most economically. If he will treat the matter of an orchard in the same way, and proceed to inquire carefully where he can best get the requisite trees, we will hear less complaints of the kind that are so prevalent among those who wait to be taken in by the first man who calls on them with a plausible tongue. I find it necessary to take this line in going out among farmers to talk to them of fruit-growing, for they have been so persistently humbugged that—although people will tell you they like being humbugged—you cannot arouse in them any interest in fruit-growing unless you point out some more satisfactory mode of dealing than the one the evils of which they have experienced in the past. But the nursery jobber is only one of the humbugs with whom we have to deal, for we frequently find humbugs in connection with reliable nurserymen among our own countrymen. Some of the regular nurseryman will send out as a sort of inducement a "catchpenny," as the saying is, and many of these have had the effect of souring farmers against the fruit industry. Not many years ago quite a number of Russian mulberries were brought into the county of Perth. I felt that the importation was a humbug when it first came in. Many persons inquired my views in regard to it, and I would tell them I did not know much about it, but would not recommend them to buy It proved a regular humbug. The next was the Russian apricot, which in the northern sections of this province is no doubt a humbug. Now, all these things have the effect of putting a damper on whatever interest may be felt in fruit culture, and do inestimable damage to the fruit-growing industry. I do not know how we are going to combat that kind of thing unless we can educate the farmers up to refusing things until they have been thoroughly tested by the Experimental Farms, where I think all these things should be tested before they are recommended for adoption. This Association has made a move in the way of increasing the interest in fruit culture by sending out representatives to the farmers' institutes. It is no use sending these men out to induce farmers to live and die in the very happy recollection of being humbugged. We want to attain some better results than that. There is another humbug which I will speak of now, which I did not mention before; that is the man who goes out and sells trees on the " home-grown tree " argument. There are lots of little nurserymen throughout the province who go out into the country among the farmers and persuade them to buy the home-grown tree. These men may have an acre or two, but they will turn over a book and show the farmer many thousand trees they have sold as being home-grown trees. Now if a man has only an acre of land and is selling thousands of trees he does not grow them on that ground, and he is just as bad as the nursery jobber.

Mr. **Cavers**.—I represent the Galt nurseries. We send out many agents and we distinctly tell them we do not grow all the stock that we sell. Of course when our men are out canvassing we do not know what they tell customers. The more tender varieties of stock we could not grow as well as they could be grown elsewhere. We know that as the result of our experience, and we tell our agents to tell our customers that we can supply them with better stock of the tender varieties by not attempting to grow them ourselves. We do not know exactly what our men tell our customers but we distinctly inform them that all the stock they get is not necessarily grown in our own nurseries. We find that by growing only those varieties we can guarantee, we are able to give better satisfaction than if all were home grown. In the Galt district we cannot grow all that is called for. Now, what are we to do? Are we to be called jobbers and ruled out of the business because we do not have all home grown? And suppose a nurseryman is growing all this stock himself, is that a guarantee that the stock supplied a customer is what he says it is? The customer has to depend upon the reliability of the men he is dealing with in every case. We make it a rule to send nothing out of our nursery that is not exactly what it is labelled. Sometimes we substitute, but when we do we put on just what it is so that the customer may refuse it if he likes. If ever a tree goes out with a wrong label it is a mistake. Something has been said here about nurserymen sending out trees that are not suited to the sections of country they are ordered for. Nurserymen have to send out what is ordered, and in some cases where, knowing that what is ordered is not adapted to the climate, something else has been substituted because it was more suitable, the cry is at once raised that there was some dishonest ulterior motive in the substitution. Now, what are we to do for that? In discussing this question of humbugs it would not be amiss, perhaps, to take a look at it from the nurseryman's point of view. We always endeavor to do things perfectly upon the square, but you see the difficulties we have to contend with.

Mr. **Denton**.—My own impression is that the further south you go the more delicacy you will find in a tree for certain parts of Canada, and my disposition would be to encourage more of our home selection. Referring to this question of humbugs which is under discussion it is very sad to go through my district, especially Lobo, and see so many orchards which men have planted and brought into bearing, and then found it was the commonest fruit grown, instead of being choice varieties such as these men paid for and expected to get from their trees. It is very hard in the face of that to induce men to enter more largely into fruit culture, but I think if they will take the list published in the " Horticulturist " it will overcome the difficulty presented. We all know that men who have stuff to sell will sell it if they can. I believe the gentleman who has spoken is perfectly honest, but are his men going to be so strictly bound down when their living depends on the exteut of their sales? I think not. The farmers generally are ignorant of what is best for them to plant, and I think it is the duty of this Association, as has been said by my friend Mr. Race, to go forth and educate them, and in ten years from this time there will be a great change.

Mr. A. H. **Pettit**.—I look upon this discussion as a mere waste of time. If we wait until the humbugs are all done away with we shall wait until the millenium.

The **Secretary**.—I think it is a mistake to make any personal references whatever in a farmer's institute; I do not think we ought to disparage any local nurseryman by name in any of our meetings, nor do I think we should advertise any of our reliable nurserymen by name although we have every confidence in them. We should recommend those varieties that are desirable for planting and be unsparing in our condemnation of those which are worthless; but I do not think we ought to make any personal references one way or the other by name of either Canadian or American nurserymen. In regard to the Russian apricot, which has been spoken of, I believe it was sent out by nurserymen both in the States and Canada with perfect confidence, because it had not been tested. It has been found that a large number of these Russian apricots, introduced by the Mennonites from Russia, were seedlings grown from the fruit of trees that fruited in the southern part of Russia, down near the Black Sea, and I am told by a correspondent in Russia that that section of the country will grow tender fruit such as we cannot pretend to grow here: fruit such as is grown in California. Russia is a word which covers a very wide territory and the southern portion of it is a very mild climate. I believe, however, that there are some varieties of Russian apricots which have been tested at the Iowa Agricultural College that have been found hardy, and I am told by Russian friends that there is a variety of apricot, known there as Ansjustin's, which is more hardy than any of the varieties we have tried.

Mr. **McMichael**.—The gentleman from Galt has said that they sometimes, under some circumstances, take the liberty of substituting. I remember a number of years ago giving an order for a considerable number of pear trees, and in filling it the nurseryman substituted some varieties and said he had not what was ordered in stock. All the substitutes with us were found to be totally worthless when they came into bearing.

Mr. **Morton**.—One humbug in connection with this matter and connected with the Canadian nurseryman is the humbug of the agents nurserymen employ. The nurseryman, according to what was stated by the secretary a minute ago, is no better than the farmer, because, if the apricot was introduced in the way he says, it proves to me that no person of any common sense would send ont a thing in perfect confidence because it had not been tested; I cannot see that it at all follows.

The **Secretary**.—He might not have known that it was a fraud.

Mr. **Morton**.—I think a person who introduces a thing, recommending it as likely to prove beneficial when he does not know anything at all about it is the next thing to the man who will recommend that which he knows positively to be worthless. A person has no right to recommend a thing of which he does not know anything. However I do not wonder at their adopting that course when I find that in appointing agents they follow a similar plan. Their agents have not been tested, and consequently, as in the case of the apricot, they have every confidence in them. Of course it is well known that some firms have had experiences the reverse of pleasant with their agents. In my own section several instances have come under my notice of orders having been duplicated by agents or raised on the face of them. I must say in justice to the nurserymen that in no case have they refused to do what was right in the matter, according to my opinion. In a great many instances the agent does not know anything about the business. I have had experience with several. One man, who came to me to sell me grapes—I pretended not to know anything about them—recommended the Niagara as of better quality and earlier than the Champion. I asked him what quality the Champion was and he said he was not quite sure of the color but he knew it was a sour grape. Now I think it is folly to send out an agent like that. It is to the advantage of the firms themselves to see that the men who represent them understand their business and are straight and honest, because on their shoulders must fall any slip made by the agent.

Mr. **Wellington**.—It is not often I take part in a discussion that lays me open to the charge of talking "shop," and I am very sorry the present discussion has assumed the form it seems to have assumed. I fully appreciate the remarks made by Mr. Morton, but perhaps if that gentleman had twenty years experience in the handling and management of agents he would be better qualified to offer advice calculated to enable me to overcome the difficulties encountered in running agents. There is much to be said against agents and nurserymen and there is also much to be said against cunning fruit growers and farmers, and when we touch upou humbugs we touch upon a very wide subject; one which might occupy a great deal more time than we have at our present disposal. In the discussion of humbugs I might tell you of many little frauds which we hear of as being committed by farmers in bringing their goods to market. All these things are very disagreeable when raked up before a class of people who live in glass houses and who therefore should not throw stones. The fruit tree agent has been of service, even with all his humbugging, because the experience people have had with him has made them more careful. The matter rests entirely with the people themselves. As nurserymen we have many difficulties to contend with and we try to meet them squarely and to deal with them in the most effective way suggested by our experience, and there is more honesty in the business than we are generally given credit for. Regarding the Russian apricot, we gave it a very fair test as to hardiness; as to the quality of the fruit we were aware we could not depend on its being uniform, but as an ornamental tree sent out singly it was no humbug. These things have to be experimented on and tested by the fruit grower as well as the nurseryman. They were introduced in the first place from Russia and they were tested by a firm who bore a very good character in Nebraska to begin with, and I do not think they will prove a humbug altogether. The same firm introduced the Russian olive, in regard to which we have been very conservative—we would not put them out at all. Prof. Saunders tells me, however, that they are a perfect success, and he thinks they are perfectly hardy at Ottawa. It is a novelty as a fruit that will never amount to anything, but as an ornamental shrub it will be a success. Still it will be denounced by some as a fraud and a humbug. We should look at these things and consider before making sweeping accusations sgainst any class of persons.

Mr. Race.—I am in thorough accord with the secretary in his remarks. I do not think it is a good principle to mention names either in a favorable or reverse manner and I have always, where I could avoid doing so, refrained from it; but it is not a very easy thing to do when you start out to talk to farmers about fruit growing, they will crowd you until you almost have to do it to satisfy them. At Meaford I took the platform at seven o'clock and the farmers, who are very keenly interested in fruit growing, kept me until ten o'clock plying me with questions. There were quite a number of agents present, but the farmers cornered me up so that I was forced to mention some of these names. As long as we have in our own country reliable nurserymen able to supply the demand I think we should recommend them, and advise our institutes to send men to buy from them what they want, direct from the nursery.

COMMITTEES, REPORTS AND QUESTION DRAWER.

After considerable criticism and several changes in values of the apples, the fruit list for Ontario was finally adopted by the Association. The list, as finally adopted, appears at the end of this Report, for convenience of reference.

FRUIT COMMITTEE.

The Secretary.—I think the present is a very suitable time for me to suggest the appointment of one or two committees. In the first place we have a little fruit on the table, and we must ask the President to appoint a committee to inspect it carefully and report on it. I had a couple of baskets of strawberries sent me three or four days or a week ago, with a request that I should bring them before the Fruit Committee of our association. Unfortunately they were in no condition to present when I came away from home. They were of a new strawberry which originated near Brantford, called Prince of Orange, or Williams' improved, so called from the originator, Mr. Williams. They were sent me by David Greig of Cainsville. The berries are certainly extra large and fine, and he tells me that they have created quite a sensation in that section, and are quite the rage among the strawberry growers, who are all trying to get them. He believes it is the coming strawberry for that section of the country, if not for the province. I am very sorry I was not able to bring the samples with me.

The President.—I shall appoint Mr. Nichol, Mr. Pafford and Mr. Dempsey as a committee on the fruit exhibited here.

OBITUARIES.

The Secretary.—I have now, Mr. President, to make an announcement that I am sure you will all be very sorry to hear. I have here a communication containing an announcement of the death of Mr. John Croil of Aultsville, which was sent to me about a week ago. Mr. Croil, who was sixty-five years of age, died at his residence on the 28th of June. This loss is in connection with our own society, and we have also to deplore the loss sustained by the Montreal Society in the death of their Vice-President, Mr. Charles Gibb, to whom we are all so largely indebted, and whom we so often welcomed in our own meetings. I think it is desirable that a committee should be appointed to draft resolutions of condolence and sympathy in regard to the loss of these esteemed deceased friends.

The President.—I appoint Messrs. Race, Beall and Craig.

Mr. Beall asking to be excused, Mr. A. McD. Allan was appointed on the committee with the other gentlemen named.

MARKETING FRUITS:

The President.—One of the questions set down for discussion by the Association at the present meeting is, " What is the best method of selling small fruits in our city local markets ?" We will hear what our Secretary has to say on that point.

The Secretary.—There is a great prejudice against the sale of fruit by auction, and perhaps there may be some reason in it. It has been tried to a certain extent in the city of Toronto, not perhaps with the most encouaging results, but I am of the opinion that if it was undertaken by reliable persons, and carried on in a systematic, business-like manner, it would be to our advantage to have fruit sold there in that way. There would certainly be no opportunity for growers to be cheated as to the proper sales made, because it would all be done in a public way. Fruit is a commodity which must be sold at once, whether by auction or by private sale, and if the public once became aware that auction sales of fruit were being held regularly I think the highest prices would be realised in that way ; certainly the fruit should bring us a fair value if sold in that way. Some days, no doubt, there might be a loss, but on the average I believe an open sale, regularly conducted, would result to our advantage. The question was suggested by Mr. Allan, I think, who desires to get the opinions of the growers in this part of the province, and that is my opinion as one of them.

Mr. McD. Allan.—I did not expect to speak to this question, which I suggested merely for the purpose of eliciting information and the opinions of the growers themselves, based on their experience in selling both by auction and in the ordinary manner. If the system of selling fruit by auction is adopted the auctioneer, in the first place, should be a person well versed in fruit, and having a thorough knowledge of its value. He stands between the buyer and the seller, and he should be a man who will not either knowingly or unknowingly do an injustice on one side or the other. He should know the value of each grade of fruit before him, and what it ought to realise. At the same time he should protect the purchasers, that is, he must not misrepresent anything, but give them the fruit required for their particular custom or trade. It seems to me that if he understands his business thoroughly, and is willing and able to conduct the sales properly, the plan must be a success, and I am of opinion that upon the whole the auction system would be the most advantageous for all interested.

The President.—Is it not the system most prevalent in the markets of the old country?

Mr. Allan.—Yes, almost entirely. Everything of that sort is sold by commission houses at auction. I think in Toronto the auction system would be most advantageous both for the buyer and the seller.

Mr. Wellington.—I think the auction system, properly conducted, is the right way of disposing of fruit. It would be well for fruit-growers to understand that Mr. James Lumbers was the gentleman who inaugurated the auction system, which he worked up for a younger brother, and so long as the business remained in his hands everyone who had any dealings with him got full and correct returns. He informs me that some of the fruit-growers were themselves to blame for the ultimate failure of the system, inasmuch as they made contracts with storekeepers in Toronto for their crop up to a certain date, and sent the best of their fruit direct to the stores and the poorer fruit to auction. This fact, coupled with the opposition offered by the storekeepers, who were making money faster under the old system and did not wish for the change, was in the main the cause of the failure of the auction system. Another cause was the want of proper quarters, and of proper facilities for handling fruit direct from the railway stations and steamboat wharves. These drawbacks combined were, I think, the cause of the failure of the auction system. In the hands of a good man I think it would eventually succeed, but in the first instance opposition would be encountered from the storekeepers in Toronto, who would do all they could to discredit the auction system in the eyes of the public. If the fruit-growers were to establish and support an auction system I believe they would in the end obtain better results in selling their fruits. The store keeper is the one who gets the profit on the fruit; the growers have suffered very severely. Many times I have seen strawberries sold at some of our large establishments, where they have a good class of custom, at twenty cents when I knew that the average returns to the grower were not more than five or six cents; the shopkeeper gets fancy prices for the good fruit, and very fair prices for the rest. Now, to make the auction system a success, there must be a combination among the growers and they must support the auctioneer. The first step is to get a good responsible firm or individual to handle the fruit at that auction and then give him hearty support and keep the fruit away from the shopkeepers; that is, do not sell to them direct and then they will have to buy it at the auction and pay its value for it.

The Secretary.—I have noticed in shipping that a great many of these commission houses to whom we ship not only sell on commission but speculate on their own account, and of course when there is a glut in the market it is not until they have disposed of their own that they offer our fruits, and as a natural consequence we get the worst of it. I have had some very sorry experience of that kind with perishable fruit and got almost nothing at all for it, though shipped in good, sound condition. It was not until after what the fruit dealers had in stock was sold, at good prices, that it was offered. In one instance I know that they had bought on contract a large number of Bartlett pears when the market was high. The market rapidly went down and pears I had sent were not sold until the prices were down to the very lowest notch. That is what makes me feel a little dissatisfied with the present method. If we had an assurance that a house would act solely in our interests we would have more confidence in getting fair treatment, but as things are now we do not feel that we are being fairly dealt with.

Mr. Wellington.—That is the basis of my statement. Some pears are sold direct and others shipped on consignment, and the latter have to take their chances while the others are placed on the market when prices are high. Of course the commission men will take care to protect themselves first.

Mr. Pettit.—We have now what Mr. Woolverton was speaking of—agents in every city. I think we have six agencies in the largest towns and cities in the Dominion.

Mr. Bucke.—What is the objection to that system. I should think they would get the best returns from their own agents.

Mr. Morton.—I suppose public competition has an effect on the purchaser. Men will often pay a great deal more for an article at auction than they would by private contract. That is my experience of auction sales in other lines.

PACKAGES.

The President.—The next question is "Should Raspberries be sold in pint baskets?"

The Secretary.—I have had no experience in pint baskets for raspberries, but I have noticed that in the New York market raspberries are sold in pints and as small measures as thirds or half pints. That seems a good deal of wood for a very small amount of fruit, but I think that in a quart box too many raspberries are put together; they pack very close and you get more than a quart of raspberries in a quart measure it seems to me. If the basket were not quite so deep it would be an advantage, and for that reason I think the pint would be better.

Mr. Craig.—The pint basket is growing in favor in Chicago and other western markets.

Mr. Morton.—I am in favor of a shallow basket as ripe raspberries break down more easily than strawberries, and even in the latter with some varieties we are bothered in the same way.

Mr. Race—The fact that one has no guarantee of fruit reaching its destination in good condition has a bad effect upon the demand. It is impossible in any of our smaller towns to get a basket of peaches delivered. I had some experience in that way last year when getting peaches from the secretary. Could there not be some light cover devised that would protect us from pilfering?

The Secretary.—I do not think that applies so much to crates in which we ship small fruits as to peaches, which we cover with leno.

Mr. Race.—I know we would get many more plums and peaches if we knew we could get such packages as I suggest. As it is we know there is a very great risk, as the express companies tell us it is difficult to deliver a consignment in good shape to a private individual, because it is supposed that the latter is not so likely to complain as a large dealer. As soon as I let them know I was a director of this Association they stopped the pilfering at once.

Mr. Bucke.—The best way would be to ship by weight and if there is any difference when they are delivered let the express company bear the damage.

A Member.—I sent some peaches from Winona to a friend in Hamilton last fall and the next morning when he got them there were two of the worst looking baskets of trash you ever saw.

Mr. Race.—There would be a large increase in the demand for fruit from my locality if there was any assurance that fruit shipped to us by express would be delivered in anything like proper condition.

A Member.—If the baskets were fixed in the way you suggest would the consumers pay extra for the fruit—the extra cost?

Mr. Race.—The additional expense would be very small; you would only have to add a little more to the price of the fruit, and I know the people up north would be willing to pay a little more if there was any assurance of the fruit reaching them in good condition.

The Secretary.—A wooden cover could be had for about a cent a basket, which could be wired down, in addition to the leno covering.

Mr. Cline.—I have had fruit stolen even from baskets with wooden covers wired on.

Mr. Wellington.—There is no doubt this is a matter which should be taken up and some measures adopted to remedy it. I am in the habit of having sent to me in Toronto from my own place some choice specimens and I do not think that in any case has the package ever reached me in the condition in which it was dispatched. Some of the best clusters of grapes would be taken out of a basket and the same applies to peaches. A man who wants two baskets must have three sent him to make sure he will get the quantity he desires.

The **Secretary**.—I was at Caledonia station the other day and saw a lot of strawberries that were being shipped in from Buffalo, which were there an hour waiting to be transferred, and the boys and everyone else were helping themselves through the openings. Now, what are we going to do about it?

Mr. **Wellington**.—We ought to take some concerted action.

Mr. **Race**.—I wrote a letter to the express agent telling him I intended to bring the matter up at the next meeting of this Association with a view to having a deputation sent to the government to see if some legislation could not be enacted whereby we could recover damages for this kind of thing. I said that at the present time there was no law that I could put in operation without going to too much trouble and expense. That letter was sent to the head office and I saw the letter sent to the agent in reply to it. It was, to go and see this man and settle his claim at once and have the agitation checked. So it is evident they do not care about having any agitation of that kind. I think their fear of such a thing is the very best proof that we should make a move in that direction.

A **Member**.—I think the difficulty in making private consignments might be got over by having some kind of package in place of the open baskets. Of course that would not do for the open market, where dealers like to have them covered with material that gives a good appearance, but I think peaches shipped to private individuals might be sent in crates, which could be had at a trifling expense.

Mr. **Allan**.—That would only be an inducement to the Express companies to throw them about. We had a thorough illustration of that at the time of the Colonial Exhibition, when our stuff was sent over in boxes.

Mr. **Race**.—I propose that a deputation be appointed from this Association to wait upon whatever government has power in the matter and to see what can be done.

The **Secretary**.—I think we might get something done. I move that a committee be appointed to interview the government in regard to the matter and see if some legislation bearing upon the question cannot be devised. I suggest Messrs. Race, Allen and Cline as members of the committee.

Mr. **Morton**.—I apprehend very great difficulties in any scheme such as is asked for. There are only two remedies against the company, a civil one or a criminal one. I very much doubt our getting legislation pointing to a criminal liability, and as for a civil liability it might be said that we have already the same remedy as any other individual. The difficulty at the present time is to prove that the fruit was stolen. The Company, in a case of this kind, would stand on strict legal ground and everything would have to be proved—that the fruit was in perfect condition when shipped, that the damage took place on the way, etc. I have grave doubts as to whether the government would interfere in the matter, but of course it will do no harm to point out the evil.

Mr. **Cline**.—I knew a shipper who took a receipt for every package and he did not have any trouble; there were no missing baskets, or, if there were, they were paid for; but it is a good deal of trouble if you are not at the station early enough for the agent to look at it and see that the packages are all right.

Mr. **Morton**.—If that is the case then the shippers are more to blame than the express company. By neglecting to get that receipt he is simply putting a premium on dishonesty. I think the shipper should avail himself of every existing means of avoiding the effects of dishonesty, and when he has done that and still suffers it will be soon enough for him to complain.

Mr. **Wellington**.—That is all very well as to the packages, but it does not apply to the abstraction of a few of the best bunches of grapes from a basket. I do not know what the present legislation is, but I think something might be framed to make the punishment of this pilfering a little more easy than it is. I think the case is a proper one to be investigated by a committee.

The Association then adjourned to meet again in the evening.

THE CURCULIO.

The **President**.—Mr. Billups will now read to us his paper on the Curculio,

Mr. **Billups**.—I have not had at my disposal sufficient time in which to prepare such a paper as I would have desired to read before this Association, but I will endeavor in a few words to give a brief outline of the curculio family. I may say, in the first place, that the curculio is distinguished from other coleoptera by having the head prolonged in all cases into a snout of greater or less extent; in some cases that snout extends three or four times the length of the whole insect, while in others it is scarcely noticeable. The curculio in fact is a very hard family to define; it is hard to say where the true curculio begins and ends. I have upon the table here a fair representation of all the different genera of the curculio known throughout the globe. I think it would perhaps be well to give a brief outline of the life history of the insect, and in doing so I do not think I shall be far wrong in taking the familiar plum curculio as an example, it being I believe a fairly typical species of the great family Curculionidæ. So infinitely small are many members of this family that it is difficult to give to one unaccustomed to them any idea of the differences which exist in the different genera, but to the eye of one accustomed to handling such small insects the difference is vast. In the diagram before you you see in No. 1 the larva of the curculio. No. 2 shows the next stage, the chrysalis, and No. 3 the perfect insect. I have in a bottle here the egg of the plum curculio. This curculio bites and destroys a great variety of fruit; the cherry, the plum, the peach, and I believe in some instances the grape. It lays its eggs early in the spring upon the plum. The female commences by working a small puncture in the skin of the plum, as represented in No. 4, and deposits the egg, and makes a semi-circular bite around the spot on which the egg has been laid. This causes the skin of the plum to wither and dry up, and affords food for the young grub. When first hatched I have generally noticed that this grub, after spending a short time in the exact locality of its hatching place, moves in a circuitous manner around the skin of the plum, and finally ends up very near the stem. This causes the plum to weaken and rot around the stem, and either by its own weight or by the first windstorm it is caused to fall to the ground. The larva, which during the time the plum rotted had a sufficient period in which to gather strength, after a certain lapse of time disappears into the ground and changes to the chrysalis state, No. 2. I am sorry to say I have no specimens of the chrysalis, but I have a number of specimens of the larvæ in different stages of advancement. Now, as regards the methods of destroying the curculio, which I suppose is the most important thing to this meeting, as far as my experience goes the only true way to get rid of them is to gather up the fallen plums. I think it is almost impossible to do anything by waging war against the perfect insect, as the perfect insect eats very little. Nearly all the feeding in insects of every order, I may say, takes place when it is in the larval state. The object of the full grown insect is chiefly to find a resting place for its egg, and that done its usefulness is over, and it dies. I think the plum curculio lays from thirty to as high as fifty eggs. Of course that means if there are twenty or thirty curculios on one tree that not much of the fruit is going to escape. The curculios are all vegetable feeders, some of them live upon the seeds of plants, some upon the stems, and a great many upon the fruit. It is generally supposed there are only a few injurious curculios, which I suppose is owing to the want of taking sufficient interest in the masses of vegetation by which we are surrounded, but there are very few plants in this or any other country but what have their own special curculio. I think there is no just idea formed of the vast number of curculios that exist upon the earth. The best catalogue we have, the Munich catalogue, which is five years old, enumerates 10,000 distinct species, but I think that in the past two or three years there have been some hundred or more specimens discovered new to America. I think Prof. Brodie, of Toronto—I am not certain in making this statement—told me he had fifteen or twenty undetermined species that he had found in Canada. If that is correct, and every entomologist has done as much as he has, though he has not made a specialty of curculionidæ—if they have all taken five or six undescribed specimens, there must have been an immense swelling of that Munich catalogue. I have here one of the larger curculio, which attacks the sugar cane. It is one of about the largest size that exists. From the facts I have given it will easily be seen that it is a family of very small and insignificant beetles that we have been dealing with, but although small, the amount of damage it does is larger than that done by any other family of beetles. Now, in the case of the larger wood-boring beetles they do not do damage, but good, and if it were not for them in a short time we should have no forests. That seems rather a wild statement to make, but looked at carefully it is a very true one. In the immense forests of Brazil, Mexico and southern countries, numbers of trees have been blown down by storms, and if there were nothing to assist the process of decay there would be such a tangled mass of fallen trees that nothing else could grow on the space covered by them. But the wood-boring beetle steps in and deposits its eggs on the bark of the tree, and in a very short time the whole mass of timber is perforated thoroughly by these immense bettles, places for moisture are formed, and in a very short space of time the tree decays and is reduced to dust, which, mingling with the earth, induces new vegetable life. I do not think, however—certainly I have never observed it—that any of the curculionidæ do the least good. I do not know that there is one good point about the family curculionidæ at all ; the only beetle I know of that has been made of any use to mankind is one of the larger curculio, the grubs of which are eaten by the natives of some countries, and deemed very delicious. Generally then they are injurious, and being such a small beetle it escapes the eyes of many insectivorous birds, and at any rate it is a very hard, unpalatable thing. I think they are the hardest shelled beetles in existence, taking a small, hard steel needle to pierce them. There is one thing in connection with this subject that needs alteration ; there has been little or no individual research either in this country or in England. We find in the reports of the entomological societies of Canada and other countries that the same facts are being brought before us dozens of times, and these facts are the result of the researches of men who lived a number of years ago, and, after all, many of the papers written by able men are but recapitulations of the work done by others. Now, this is not the case in other branches of entomology, and I think it a pity it should be allowed to be so with Curculionidæ. To give one instance of the small amount of interest and study that has been devoted to curculionidæ in Canada, I may state this : During my stay in England I visited some twenty of its best museums. In the South Kensington branch of the British museum, which contains the best entomological collection in the world, our Curculionidæ were represented fairly. In the Oxford museum, the second finest in the world, there were barely one hundred specimens of our Canadian Curculionidæ. In other countries the Curculionidæ were better represented in their larger and more showy insects, but there were only about one hundred specimens out of our five hundred species. It is my wish, if I can secure help from any entomologist in Canada, to send over this fall a fairly representative collection of our Curculionidæ, and I only hope I shall be able to get that help. I cannot do very much myself, being unable to move from one locality to another, and I hope I shall have help from everyone who is able to give it, and if such persons will only try to assist me in getting specimens I shall be doubly obliged. I think it is only right that the Dominion should be better represented than it is at present in England.

Mr. MORDEN.—Does the ordinary plum curculio attack cherries and pears, or is it a different variety.

Mr. BILLUPS.—The ordinary plum curculio this year destroyed nearly ninety per cent. of the crop of a cherry tree. The tree was unsprayed and not protected in any way, being one I left in that way as an experiment. This tree was situated some two hundred yards from any plum tree.

Mr. MORDEN.—What about pears ?

Mr. BILLUPS.—I have specimens in a bottle here ; I think there were about thirty pears on the tree, and none had less than one, and some three or four bites of the plum curculio.

The SECRETARY.—It also affects the apple ?

Mr. BILLUPS.—Yes, that is a pretty well known fact, but I have not made any experiments.

The President.—And the peach?

Mr. Billups.—Yes, it attacks the peach. I do not think it will ever become sufficiently dangerous to the peach to excite much alarm.

A Member.—Too much wool?

Mr. Billups.—Yes, too much wool. If a curculio finds any dirt or dust on a plum it is working on it will generally leave it for a clean one.

The Secretary.—You think the application of some other dust than Paris green would work almost as well?

Mr. Billups.—I may be making a rash statement, but I believe if trees were dusted with powdered ashes it would be just as efficacious as Paris green.

The Secretary.—I have a row of cherry trees on the roadside, where it is dusty, and I seldom find them affected by the larva of the plum curculio; that would corroborate your theory.

Mr. Billups.—Yes; I am very glad to hear that statement. So far it has been my theory, unsupported, but I do not think I am wrong in saying it. I may not be entirely right, but I am right to a great extent. I believe that Paris green acts more as a mechanical agent than as a poison. I think when we take into account the small amount of food necessary for a curculio, and the limited space it touches upon the plum, it will be evident that it can get but a very small dose of the poison.

Mr. McMichael.—Does the larva of the curculio resemble the larva of the codlin moth in its habits?

Mr. Billups.—No; it stays in captivity until it is fully ready to enter the earth.

Mr. McMichael.—Paris green has no effect upon the larvæ?

Mr. Billups.—No, not the least, because it never sees daylight until it is ready to enter the ground; all the work is done in the skin of the plum.

A Member.—In regard to the curculio not liking peaches, there cannot be any dust on my peaches, for they seem to take them very freely; I found two rows in which I do not believe there was a single peach that had not been bitten two or three times.

Mr. Billups.—I am much interested in learning that fact; it only shows more clearly that the curculio is one of the worst enemies the fruit grower has to contend with. It would seem that the plum curculio attacks almost any kind of fruit.

The Secretary.—About what length of time do you find that the beetle continues its operations?

Mr. Billups.—As soon as the plum blossom falls it begins, and the day before yesterday, July 7th, I found a curculio in the act of laying its egg, which shows very clearly that it is incessant. I very carefully watched the tree, and I am satisfied my statements are correct. I have seen them on the plum, searching around for a place and have seen it force in its beak and withdraw it, and prepare to lay its egg. I think that is a thing that Mr. Saunders does not mention in his book—the length of time the curculio operates.

Mr. Morden.—I think it ordinarily does its work in about ten days.

Mr. Billups.—Well, the injurious work is probably done at that early stage, because after the fruit is well developed the curculio is comparatively harmless to the fruit, though it spoils the look of it. I have had pears, for instance, bitten three or four times; it does not actually kill the pear, but it makes a little rough place. Some people think that the better fruit is not attacked, but I do not think that is so. It is because the better fruit is taken more care of and sprayed more frequently. I think they are just as likely to attack the better plums as the blue common plum.

A Member.—Is there any parasite of the curculio?

Mr. Billups.—Yes; but at present my experiments are in such early stages that I am not prepared to make any distinct statement on the subject. I may say, however that there are to my certain knowledge two or three distinct parasites of the curculio. The question arises whether we can so foster and encourage the parasite that in time it will become stronger than the curculio, and eventually wipe it from the face of the earth altogether. I am trying a few experiments on a small scale to find out. Another curious thing about the curculios is that they seem to come suddenly and to disappear suddenly Four years ago the corn weevil was very scarce in this locality, and the next year it appeared in vast numbers. I found it on the white oak, the red oak and on quercus robur; on three oaks. That in itself was a rather remarkable thing, as entomologists have hitherto noticed it only on the white or the red oak, I am not sure which, while I found it distinctly on three oaks. This year I have found traces of none, except one perfect insect I found on the 24th May, and the year before there were none. They seemed to appear one year and disappear entirely the next. In this Prof. Brodie's notes agree exactly with my own.

PEAR BLIGHT

The President called upon Mr. McMichael, of Waterford, to speak on his experience with pear blight.

Mr. McMichael.—This is a subject in which I am very much interested, sadly interested this year and last year. I think it is now about twenty-five years since I began pear culture, and during that time we have had three recurrences of the pear blight. We would have about three years during which the blight was bad, and then perhaps five or six years freedom from it. We have also found that during the time it was bad in the pears it was also equally bad on the apple trees. In my pear orchards, where the blight has been worst, usually there has been an apple tree badly affected, and from that it spread very much worse to the pear trees. Where we have taken those trees out we have very much sooner got rid of the blight. Last spring—I may say that previous to that we had not been troubled for a number of years—I commenced cutting on it about the middle of July, and I have reason to regret that I did not commence a month sooner. This year, in an orchard of about 150 pear trees that have been planted out nearly twenty years, the trees had suffered a number of years with a fungus which caused the wood to become very brittle and hard, and this spring, I think on the 9th of June, I commenced working in them, and the points of attack would average from fifty to seventy five or a hundred in each tree. They were in the twigs, and under the twigs. With one hand I broke the twig out; and with the other, with a paint brush filled with linseed oil, I went very thoroughly over the orchard, and I have done so four or five times since, and in scarcely an instance where this was taken out did the blight reappear. A few days after that I went into another orchard of trees, set out about eight years, which were remarkably thrifty, the growth long and the limbs just curling over and the tree full of bloom, but in those trees I found it very difficult to cope with the blight. The great difficulty is down on the limbs; these little twigs blighted, and in three or four days the bark would be colored, but by going over them every other day, just as the leaves began to turn, the art of taking these twigs off with a knife and painting over with linseed oil, I was enabled to save the limb. I had been led to believe, by the treatise of Prof. Burrill, that all the virus entered through the bark, or where it was punctured, but in this orchard in nearly every instance it entered through the ends of these little matured leaves or the blossom, and, where these are cut out, just a little paring around it stops it. The bark being punctured the virus might easily enter again, but the oil has a tendency to keep that out by closing the pores. If that orchard of eight hundred thrifty trees had been left until now without taking those diseased portions off, I might as well have burned every tree, but the present indications are that we shall be able to save it. One of the mistakes I made was in not cutting low enough; you have to cut three or four inches below any coloring of the bark, or the blight continues. In the other orchard, where the limbs are hard, there was no difficulty in staying the blight.

A **Member**.—Is painting without cutting any good?

Mr. **McMichael**.—It is no good unless you cut below the blight.

Mr. **Morden**.—Did anyone ever paint before the leaves came out?

Mr. **McMichael**.—I did for a number of years, with the body and the limbs, and there was no trouble. I thought oil was a preventive; but my impression now is that the virus enters mostly through the leaves, so of course it would not do any good. But it is a very great benefit to prevent the virus entering; you see in cutting off the limbs that that is the place where the virus can enter. It is very difficult to avoid making some little breaks in other limbs, and the painting with oil over them prevents the blight entering.

Mr. **Cline**.—Did you ever try leaving the blight on the tree and letting it spread?

Mr. **McMichael**.—No.

Mr. **Cline**.—I have tried it and it never has gone any further.

Mr. **McMichael**.—In our locality there are lots of trees entirely dead.

Mr. **Cline**.—It just killed the top limbs down four or five feet. They were pretty tall trees and I never cut them off.

Mr. **McMichael**.—Going from our place to Brantford wherever the trees were left they are all dead, but where part was cut out it saved the trees.

The **Secretary**.—Mr. McMichael has the impression that Prof. Burrill states that the pear blight only enters through the bark.

Mr. **McMichael**.—Yes.

The **Secretary**.—Professor Burrill told me last year that the point through which the blight most commonly enters is through the blossoms and the young growth at the end of the branches. It may have been a previous statement of his that Mr. McMichael saw, but I thought it best in justice to the Professor to mention it. His latest investigations seem to have convinced him that it is chiefly through the blossoms that the spores of the pear blight fungus find their entrance into the tree. Therefore just after blossoming time, as soon as we discover the least indications of blight in the blossoms or the leaves about it, we should carefully go over our orchards and in that way we may be able to save the trees.

Mr. **McMichael**.—My observation is that it enters more through the leaves than the blossoms, and in four or five days the tree is destroyed if these are not taken off.

A **Member**.—Is there any difference as between trees that are cultivated and those which stand in sod?

Mr. **McMichael**.—It seems at the first output of the leaves that it is as bad in trees that are not thrifty, but it continues very much longer in the thrifty trees. It is also my observation that where trees have been manured with barnyard manure they are very much more liable to it than where ashes havs been used.

APPLE PACKING.

The **President**.—I have no doubt there are many here who are interested in apple packing. Mr. A. McD. Allan will now address us on "Repacking apples in Britain; drawbacks and advantages; why repack, and how."

Mr. **Allan**.—This is a question I suggested for the purpose of drawing out certain information which I am interested in getting. I suppose you are all aware that I am intimately connected with the Imperial Produce Company of Toronto, a company which is engaged in handling all kinds of Canadian produce in the British markets, and it is my wish to make special experiments in a great many lines in the interests of the fruit growers of Canada. This question of repacking occurred to me four years ago when I was over in Britain at the Colonial Exhibition. A great many cargoes of the apples that are packed and shipped from Ontario and other parts of Canada to Britain arrive there in very poor condition. This arises from many different causes. In the first place some of the apples are not fit to be packed or put in the barrels—apples with particles of rot upon them or fungus spotting. They are very apt to heat from some cause, and the result is that rotting takes place and the barrel of apples is more or less damaged. It is rather the exception to find a cargo that comes out entirely in fine order; there is more or less damage, which those who ship over there will have seen mentioned in the returns mostly as "slack, wet." It occurred to me, and I carried the idea into execution, to take a cargo of that sort, open it up, and repack it. Of course there are a great many objections to repacking. I would not advocate repacking a good barrel of apples, as a rule, because there are more or less bruised specimens in it, and you would really lose a considerable number of the apples by the repacking; that is there are a considerable number you cannot call first class specimens fit to repack in a smaller package. But in the case of a damaged cargo I have known instances where it would be impossible to do otherwise than lose money for the shipper by placing them on the market in the shape they were in. There would be no way of disposing of them in the condition in which they were landed and making money of them for the shipper. Then the question is what can be done? I find in the majority of cases of that sort that there is a large quantity of really good apples, for which, by repacking them in a smaller package, I could realise fancy prices. For well culled, uniformly sized, finely colored fruit an extra price can always be realised in the British market, and by observing that I have been able to bring the shipper out money in pocket when he would probably have been at a heavy loss otherwise. Now, I would like to hear from those who have had personal experience in this matter of repacking what objections there are to that method. Our company has the idea of going into it if it is found to be in the interest of the fruit growers in Canada. We have all the accommodation and necessary arrangements made to do so and at a comparatively nominal cost to the shipper or grower. My own belief is that it is going to be largely a matter of experiment for I have met very few persons who have any actual experience in it. You must look for a loss in repacking; but under any circumstances, with such cargoes there is more or less loss at any rate. I would prefer selling the fruit in the original package if it was in anything like the proper condition, but, as I have said before, such cargoes are rare.

The SECRETARY.—You spoke of putting the apples in a smaller package. What description of package?

Mr. ALLAN.—I trade the barrels off for boxes and baskets; anything I can get. There is little or no difficulty in making a trade of that sort and I certainly found it advantageous to sell in small packages. I see but one disadvantage in getting second-hand packages. They judge fruit in the British market by the package in which it is. If they see a fine, well got up package they want to see what's inside it and they conclude at once that a man who has packed in that way cannot afford to put a poor article in the package. Every one is keen to get hold of such packages and they will always pay more than enough to cover the extra cost of packing.

A MEMBER.—Would you ship half barrels?

Mr. ALLAN.—Yes; I think so. We used to sell pears by the barrel, but pear growers have learned that there is more money in selling them by the basket. You can make a good deal more money by selling them in the smaller package even in our own markets.

Mr. NICHOL.—What do you think of box crates holding a bushel and a half of apples?

Mr. ALLAN.—I believe there would be more money than in shipping in the ordinary way in barrels and they would not cost any more. For one firm we are making a specialty this year by putting up apples in crates, so many boxes to a crate. The boxes are supplied with a pasteboard division the same as egg boxes and an apple in each division, packed just as eggs are. They are putting up fine Wealthy and Fameuse apples that way.

Mr. NICHOL.—I think they would be more careful with a box than a barrel, which is rolled, would they not?

Mr. Allan.—Yes; though they are getting into a better system of handling now. On the other side barrels are handled much more carefully than here. The only objection to a square package is that you cannot pack as tightly or well to keep them from moving. I would not advise the putting up of anything except very choice fruit in the small packages, nor in any package for that matter, because it takes as much labor and costs as much money to pack and send across a poor lot of apples as it does for the best.

Mr. Nichol.—Have you tried rolling them up in tissue paper?

Mr. Allan.—I did try that a good many years ago and on that occasion it came out well, but to what extent that could be profitably carried I do not know. You will find a good deal of fruit handled that way in Covent Garden. Something of that kind could be done with extra fine specimens in repacking. I am strongly impressed from the little experience I had three years ago that repacking of these poor cargoes might be resorted to advantageously. Boys and girls can be hired to do the work at merely nominal wages and the only trouble is the loss of the poor and bruised fruit.

The Secretary.—I would like to ask you about early apples. Do you think it would be possible to get any of our early apples over?

Mr. Allan.—Yes, certainly. I think the Duchess would go but it must be picked on the green side. You could scarcely try Red Astrachan. All early apples must be kept in a cool atmosphere. I do not see the slightest difficulty in taking those soft fruits across in a cold air compartment, and I believe we could get higher prices for those early fruits than we can expect for our winter varieties.

The Secretary.—Do you think it would be possible to get pears over to England; Bartlett pears that are picked green?

Mr. Allan.—I think there would be no difficulty in getting them over with the same vessel arrangements. As to how it would pay that would depend altogether on the state of the American crop. If the British and European crop was short it might be expected to pay well. I would not advise the shipment of our pears to the English market except under those circumstances.

Mr. Dempsey.—Does the pear crop often fail in the channel islands?

Mr. Allan.—I do not think so. If we could educate the English taste up to appreciate the fine flavor of our pears we might do better, but they have not got to that point yet. They are coming to it gradually, however. They now eat our apples, while a few years ago they thought they were no good except for cooking.

HOW TO MAKE THE BEST OF TEN ACRES IN FRUIT CULTURE.

Mr. Morden.—The first requisite is the right man, and that man must have the qualifications of a solid business man. To make money in fruit growing requires business talent and it is a great mistake to imagine that a person lacking in business ability will ever make a successful fruit cultivator. Next to that business ability he requires a knowledge of the business he is engaged in. I will not dwell upon this, although it is a current idea among city people that every man is a born farmer and fruit grower. If you want to find a man who thinks he knows all about agriculture and fruit growing it will be necesary for you to go in search of him in the centre of some densely populated city. The men who have followed this business all their lives know very little about it. Although, as I have said, this is a very common idea it is a mistake. The fruit grower needs a practical knowledge of his business in addition to business qualifications. He also requires pluck and must be willing to work and fight weeds eight months of the year. He must hate weeds with an undying hatred and manifest that hatred every day of the week except Sunday. Having got the right man the next thing is to locate him in the right place. In the first place I would locate that man near some source of fertilisers. It is necessary to put him near some town or village of considerable size, because to get the best results out of ten acres requires no inconsiderable application of fertilisers. I would also have him near a local market. It is rather a difficult thing to make a fortune out of growing fruit and shipping it exclusively to distant markets. I have myself a very deeply rooted aversion to wearing out my life in the behalf of express companies and carriers and commission men. Yet that is about the history of our business. The carrying companies and commission men have been making money fast and we have been getting very little. By being located near a local market we can very largely get rid of that trouble, but it is seldom that a local market alone is sufficient for us and it is therefore also desirable to be near a good shipping point, one at which there is competition, more than one way of reaching the outside market. From this point, for instance, you have as a rule only the steamboat to connect you with Toronto. At the Falls we have a variety of ways: we commonly send our fruit into Toronto, just past your door, as cheap or even cheaper than you send yours at the present time. We ship very largely through St. Catharines and Port Dalhousie and we get it to Toronto just as cheap as the people of Port Dalhousie. Then we have as alternatives this route and the Great Western railway line. It is a great advantage to have a variety of ways of reaching the market. Now, having the right man in the right place, which is near some town or village, you must have for the next thing the right kind of soil, which is a very essential thing. It is quite possible in a small plot where the soil is not right to make it right, but it would be rather a large contract to undertake to make ten acres, not naturally adapted to the requirements of the fruit grower, suitable for them. I think it was Henry Ward Beecher who said he never respected a mountain so much as he did after he had attempted to make one, and I would not advise any one to try and make ten acres of hard clay or very poor sand or swamp into a fruit farm, because you have to compete with men who have suitable soils for the profit of the business, and to do so with any hope of success you must start on even terms with them. If you start with a bad soil the chances are that the business will be a failure as a matter of profit, and, as it is evident that the produce of ten acres of land in fruit culture would be more than a single family would consume it is as a matter of profit we are considering this question. Now we have the right man in the right place with the right soil and he goes to work. Another one thing is this, and in this I have failed though I generally try to practice what I preach: if you are not able to fertilise ten acres properly sell five and fertilise the other five. Fruit growing requires a great deal of manure, and it is my experience that a great many of the artificial fertilisers are a failure; indeed I have never yet been able to get ten dollars back from a ten dollar expenditure in that line. The preparation of ground for fruit culture is a different thing from preparing it for the ordinary crops. If you wished to secure a good ordinary farm crop of oats or barley you would probably not cultivate very deeply, but with fruit the ground requires to be more deeply and thoroughly worked because the fruit will occupy the same ground year after year, even in the case of strawberries probably two or three years, and I have never yet been able to turn in manure so deeply that these plants would not find it, so you need not be at all alarmed about cultivating too deeply. The soil should be very deeply cultivated and thoroughly worked, and all the weeds eradicated as far as possible before planting. In planting raspberries, gooseberries and currants, plant in squares so that you can cultivate crosswise. Raspberries you put five to six feet asunder and about four feet in the row, so you can cultivate both ways. With gooseberries and currants you may plant closer, it will depend on the richness of the soil; but as far as possible get cross cultivation by which you will find the expense of cultivation very much reduced and the results will be better. In some cases of course you plant in rows. At the outset you can plant a vegetable crop between your gooseberries, currants and raspberries, or grapes. In grapes I am favorable to the idea of making the rows somewhat wider asunder, by which you can get through readily with a waggon with manure, and you can utilise the space between by getting a crop early in the season, because some vegetables will be allowable in the case we are speaking of now. In regard to the varieties of fruit to be planted that will depend very much on the kind of soil you have. If your soil is entirely sandy you cannot plant so largely of some varieties as you otherwise could. With a sandy soil my crop of currants would be less and my raspberries greater. One of the things that the possessor of ten acres would be very likely to plant at the outset is strawberries. I would not advise, however, that any one should do what I have frequently seen done, to plant these with a row of grapes, because there would be a good deal of difficulty in taking the strawberries out later on. I do not fancy planting them in the rows. To make a success of planting strawberries the soil requires to be made very rich. Another crop is gooseberries. From currants I have been able to make almost as much per acre as from any other fruit I have ever grown. No matter how cold the weather you are almost sure of a crop of currants, although this year I have a very poor one; but we never get a total failure and generally get good crops when we give them careful attention and fight against the worms, which we must do. Just here I may say that I met with a difficulty this year. Hellebore has been the remedy all along, but the hellebore I got this year is so very mild that the currant worms will be killing the bushes next year. I have planted and grown raspberries very largely and make as much money with them as with any fruit. I plant so as to cultivate both ways and I use cultivators with knives. The sucker question is no matter of difficulty with me. I have been able to get very large returns from raspberries. I find that although you may get more strawberries to the acre, raspberries will give you ten or twelve cents a basket as readily as strawberries will six, and I have always realised readily with raspberries. One reason perhaps is that I compete with our American friends in their own markets. Nearly all the raspberries I grow are sold in the United States. In that I have the local market I have just been contending for, and in operating the local market I have followed the plan of taking orders from private families, which I can very readily do where I am known; and I get the retail prices and my baskets back. I have no baskets or crates lost or stolen. I can pick my berries at three o'clock in the afternoon and at six o'clock in the evening I am home with the money in my pocket. Blackberries can be sold at good prices and are grown with profit at a few points, but I would not recommend generally the culture of them even on this Niagara peninsula. I have never made a great success of them, but some men have, so it is not for me to say because I have failed with a certain fruit that no one else will make a success with it, and I find that other people in other places do succeed. Quinces can be grown on a ten acre plot; they can be planted closely, as I stated before, and other things can be grown between while they are young. I would grow plums also, especially if I had some clay. I have an immense crop on my trees and I never fail in having a crop of some kind, although mine is sandy soil on which we have to fight the curculio. I would also grow pears in a limited area like this. Plums, pears and quinces can be grown where your space is limited because by giving the care and cultivation I have spoken of a great deal can be accomplished in a small space where the land is rich. Now, in dealing with ten acres you must remember that you are to be confined to that area and you must not at once plant the entire area with fruit because the fruit must be renewed from time to time. One of the secrets of success in small fruit cultivation is the renewing of your cultivation very frequently; with raspberries and gooseberries perhaps once in seven years, and oftener in the case of strawberries, and it is always desirable to have some space reserved for that purpose which may be used otherwise in the meantime. Anyone who would succeed in the growing of small fruits must be prepared to do an immense amount of cultivation as compared with the ordinary farmer who puts in his crop of corn or potatoes aud cultivates it once or twice. I find it necessary to cultivate my ground twelve or fifteen times a year, and to hoe nearly as often, though hoeing is not necessary so often, because if the ground is rich the shading of fruits will prevent the growth of weeds. We can keep weeds down very easily where the land is in thorough cultivation.

The SECRETARY.—Which would you rather have: ten acres of fruit planted and cultivated in the manner you have described or a hundred acres of ordinary farm without any fruit?

Mr. MORDEN.—Well, of late years farming has been rather a poor business and it would hardly be fair to make a comparison. It would be a mistake to think that you would get from ten acres of fruit the same profit as from one hundred acres of ordinary farm land with one-tenth of the expenditure, but in farming one hundred acres there is a considerable investment for implements and buildings, and it is difficult to get your interest out of it. If you bring that down to ten acres of course there are a great many advantages. You may do with a less expenditure for buildings, etc., and there will probably be less hard, heavy labor, but you must not run away with the idea that you can do that without expense. The fertilisation, planting and caring for ten acres of fruit so as to get a profit is going to take considerable. I think it would be well in a hundred acre farm to devote ten acres to fruit; but if I lived ten or fifteen miles from any market I would be sorry to drop ninety acres of it and devote the remaining ten to fruit.

Mr. Billups.—I have tried pyrethrum and have found it ahead of hellebore and it is not poisonous in any way as the hellebore is.

Mr. Bucke.—Why do you not use Paris green ?

Mr. Morden.—I use it early in the season. The currant worms make their appearance early in the season and sometimes I give them a little.

The Secretary.—I have very little trouble with the currant worm. I use the hellebore in the powder, shaking it on the bushes just when the currant worm first appears, which is quite early. We find him near the base of the bushes and I blow it down among them and give them a good dusting. Early in the year you have very little dusting to do and it is very effective.

CULTIVATION OF THE PEAR.

Mr. Dempsey.—It would not be possible for me at this late hour to go into any extended remarks upon the pear. As to its culture I would select for it first of all a soil a little on the clayey side and I would prefer a northern exposure, ascending slightly to the north. I find that our trees situated in that way are less liable to blight. They mature wood earlier in the fall and consequently they are more hardy. I grow some of my finest pears on what was formerly a brickyard. I have had people walk through it and pick up a little of the soil and say, " Oh, my ! if I had a soil like this I could grow pears too." But it is one of the stiffest clays we have in any part of the country and the secret is it was always dry. We have heard considerable about blight taking our pears and apples. Now, I would simply endorse what we have heard to-night on that point and let it go just there. I am satisfied the blight comes first through the leaves and if neglected in a short time it becomes past cure.

Mr. McMichael.—My experience as to a northern or southern exposure varies a little from Mr. Dempsey's ; I should recommend as a result of my experience a southern rather than a northern exposure.

Mr. Morden.—I have succeeded with some pears in a soft soil, though I believe a hard soil is right. The specimens were not as good as those from a harder soil.

APPENDIX.

REPORT OF FRUIT COMMITTEE—SUMMER MEETING.

The Committee on Fruits report:

That they have examined the gooseberry Pearl and can recommend it as a most prolific bearer, and the samples exhibited show no indications of mildew and larger ones shown are a good sample, and are presumably a variety of the Whitesmith and well worthy of cultivation. We also have noticed the King Conn, which for appearance does not compare favorably with larger varieties, also a sample of the Industry, which is now become a favorite variety. We have also noticed some excellent samples of currants, the Fay and Versailles, &c. (Sent from Experimental Farm, Ottawa.) No. 369 is a berry of fine size, superior flavor and highly commented on. No. 169 is of fair flavor, medium sized, and worthy of cultivation. No. 175 is too long gathered to retain its flavor; seems very productive. No. 362 is a large berry, good flavor, will rank No. 1. The strawberry Pearl is a marvel for size and beauty, highly flavored and wonderfully productive, also some seedling strawberries. The sample No. 189 is productive and worthy of further trial. No. 307 is of good flavor and worthy of further trial.

THE ONTARIO FRUIT LIST.—APPLES.

The Committee on the Ontario Fruit List reported as follows:

Your two committees appointed at the last summer meeting at Seaforth to prepare catalogues of all fruit commonly grown in this province in such a manner as to show (1) a list of the varieties grown in the province; (2) lists showing the varieties best suited to the climate, elevation, soil, etc., for every district or locality, and (3) that any and all such lists be so prepared or constructed as to enable judges at competition exhibitions of fruits to intelligently estimate the true comparative value of any fruit on exhibition and thereby secure uniformity and fairness in judging fruit at all such exhibitions, beg leave to report:

That upon a careful consideration of the subject it was found that the duties of the two committees were so inextricably mixed as to make it necessary for them to work conjointly.

The catalogue of apples herewith submitted is therefore the work of your joint committee, and is the extent of their work to the present time. This report is therefore a report of progress.

The first decision arrived at by your joint committee was to leave out the headings usual in such a catalogue, such as Size, Color, Hardiness and Productiveness. The first two, Size and Color (to which might have been added Shape), are omitted because any such description to be of value should be sufficient for identification of a variety, but has not yet been done by our best pomological writers. The headings Hardiness and Productiveness are also omitted because they are applicable throughout the province to but a very few varieties, yet many of the varieties grown are both hardy and productive in many places.

You will observe that your Committees have adopted four general headings, viz:—Season, Quality, Commercial Value, and Total Value. Quality and Commercial Value are however sub-divided: quality into Dessert and Cooking, which embraces about all the properties of Quality; and Commercial Value into Home Market and Foreign Market, which gives the nearest approach we may make to the commercial value of any fruit.

The plan of rating adopted is to suppose all varieties to be perfect specimens. Then, the best varieties under each of these four heads are rated at 10 and all the more or less inferior varieties by some figure less than 10.

It frequently happens, however, even with the best varieties, that imperfect samples are exhibited. In such cases all values given in the catalogue must be reduced one or more points each for lack of color, under size, unevenness of size on plate, wormy, scabby or ill-shapen specimens, lacking stem or calyx, polished fruits *i. e.* having bloom wiped off, or for any other thing which tends to change the natural appearance of the fruit.

The column Total Value is for use when prizes are offered for fruit without designating the purpose for which such fruit may be required.

All of which is respectly submitted.

Signed,
THOS. BEALL, Chairman.
ALEX. McD. ALLAN,
P. L. DEMPSEY,
P. C. BUCKE.

WINDSOR, 10th December, 1889.

This catalogue was sent to the Minister of Agriculture in July, 1890, accompanied by the following letter from the Secretary. From the Department printed copies were sent out to all Secretaries of Agricultural and Horticultural Societies in Ontario.

To the Honorable CHARLES DRURY, *Minister of Agriculture :*

SIR,—The Fruit Growers' Association of Ontario has had under consideration the subject of "How to attain greater uniformity and fairness in the awards of Prizes at Fairs." The great disparity in these awards has been a matter of public comment. This has been especially noticed in cases of collections of fruits where the rating of the values of the varieties has been left entirely to judges, some of whom are incompetent, and know very little of the comparative merits of the varieties placed before them. Even in cases of single plates, many of the judges employed are in a quandary as to whether an apple, for instance, should be classed among the fall or winter varieties.

The present system of appointing three judges in the fruit department of our Agricultural Fairs is also thought to be a mistake, for, even if one of the three is an expert, the final judgment will often be reversed in deference to the opinion of the other two.

Now, in order to secure uniformity and fairness in the awards and prizes for fruits at fairs, the first important consideration seems to be the appointment of fruit experts who will not award prizes for winter apples to autumn varieties, or allow one variety to pass for another because of their inability to identify them. If three expert judges cannot be had it appears to our Association that it would be far better to engage one expert, throwing upon him the whole responsibily and remunerating him accordingly, as is done in the judging at the poultry shows. Such a judge might also be required to give a list of points upon which his judgment in each case was based.

It is evident that the educational value of our fairs depends very largely upon the correctness of the judgments given, and it is therefore exceedingly desirable that the work of the judges should be based upon some one standard, for even experts will differ with regard to the value of the various kinds of fruits, and their judgments cannot therefore be expected to be uniform.

To aid the directors of the Agricultural and Horticultural Societies of Ontario in attaining so important an object as has been indicated above, the Ontario Fruit Growers' Association has undertaken the preparation of a Fruit Catalogue for the Province, beginning with the following one of apples, to which, in the near future, is to be added catalogues of other fruits prepared in a similar way.

The Catalogue is not intended in any respect to be a guide for planters, as this has been dealt with in other lists which will appear in the next annual report of the Association, and because fruits which might be of general excellence might be ill adapted to certain localities.

In order to the better understanding the Catalogue a few explanations will be necessary. It will be observed that the usual headings found in such a catalogue, such as "Size," "Color," "Hardiness" and "Productiveness," have been omitted, the first two because any such description to be of value should be sufficiently full and accurate to serve for the identification of the varieties, and the other two because there are very few varieties which are uniformly hardy and productive throughout the Province. Four general headings have been adopted, viz., "Season," "Quality," "Commercial Value" and "Total Value."

In the plan of rating, all varieties are supposed to be perfect specimens; then the best varieties under each of three or four heads are rated at ten, and all the more or less inferior varieties by some figure less than ten. It frequently happens, however, even with the best varieties, that imperfect samples are exhibited. In such cases all values given in the Catalogue must be reduced one or more points each, for (1) lack of color, [2] undersize, [3] unevenness of size on plate, [4] wormy, scabby or ill-shapen specimens, [5] lack of stem or calyx, [6] polished fruits, *i. e.*, having bloom wiped off, or for any other thing which tends to change the natural appearance of the fruit.

The column "Total Value" is for use when prizes are offered for fruits without designating the purpose for which such fruits may be required,

The committee to whom the preparation of this list was entrusted consisted of the following gentlemen, viz.: Messrs. Thomas Beall of Lindsay, Alexander McD. Allan of Goderich, P. C. Dempsey of Trenton, and P. E. Bucke of Ottawa, but before publication their work was submitted to a general meeting of the Association, where it was carefully amended and the desirability of its circulation among the secretaries of Agricultural and Horticultural Fairs agreed upon.

I am, Sir,
Your obedient servant,

LINUS WOOLVERTON,
Secretary.

GRIMSBY, July, 1890.

Catalogue of Apples for the purpose of securing greater uniformity and fairness in judging at Exhibitions.

Name.	Season.	Quality.		Commercial value.		Total value.
		Dessert.	Cooking.	Home market.	Foreign market.	
Alexander	A	0	9	9	10	28
American Golden Russet	W	9	8	8	9	34
American Summer Pearmain	S	3	1	2	0	6
Arnold's Beauty	W	5	2	2	3	12
American Pippin	W	5	8	3	5	21
Adam's Pearmain	W	8	8	7	7	30
Autumn Strawberry	A	5	1	2	5	13
Bailey Sweet	W	2	8	1	3	14
Baldwin	W	2	5	7	8	22
Beauty of Kent	A	0	8	8	7	23
Ben Davis	W	0	1	8	9	19
Benoni	S	10	0	1	0	11
Belmont	W	3	6	4	6	19
Blenheim Pippin	W	6	7	9	10	32
Blue Pearmain	W	6	6	8	8	28
Bottle Greening	W	6	7	2	4	19
Bourassa	W	5	4	3	6	18
Cabashea	W	2	7	8	9	26
Canada Baldwin	W	6	8	8	9	31
Canada Reinite	W	4	8	5	7	24
Cayuga Red Streak	A	2	8	7	8	25
Chenango Strawberry	A	8	3	7	0	18
Colvert	A	1	9	7	8	25
Cornish Gilliflower	W	1	0	1	2	4
Cox's Orange Pippin	A	9	3	7	10	29
Cranberry Pippin	W	7	8	8	8	31
Cellini	W	2	8	7	6	23
Domine	W	5	7	6	7	25
Drap d'Or	A	2	6	3	5	16
Detroit Black	A	0	4	2	4	10
Duchess of Oldenburgh	S	2	10	10	10	32
Dyer	A	7	5	3		
Early Harvest	S	9	3	9	0	21
Early Joe	S	8	3	3	0	14
Early Strawberry	S	8	2	7	0	17
Edgar's Red Streak	W	5	7	7	8	27
Ella	W	2	4	3	5	14
Esopus Spitzenburg	W	9	7	9	10	35
Fallawater	W	7	8	8	9	32
Fall Janeting	A	3	7	7	7	24
Fall Orange	A	4	7	6	3	20
Fall Pippin	A	6	8	7	7	28
Flushing Spitzenburgh	W	6	6	6	7	25
Fameuse	A	9	5	9	8	31
Fall Queen (see Haas)						
Gloria Mundi	W	0	8	6	8	22
Golden Russet (English)	W	8	7	8	9	32
Golden Sweet,	A	2	4	1	0	7
Grand Sultan	A	2	7	7		
Gravenstein	A	9	9	10	10	38
Green Newton Pippin	W	9	4	6	8	27
Grimes' Golden	W	9	2	6	7	24

Note.—In the first column the letter S denotes summer, A autumn and W winter.

CATALOGUE OF APPLES.—*Continued.*

Name.	Season.	Quality.		Commercial value.		Total. value.
		Dessert.	Cooking.	Home market.	Foreign market.	
Haas (see Fall Queen)	A	5	7	7	6	25
Hawley	S	6	5	5	0	16
Hawthornden	A	2	8	7	7	24
Holland Pippin	A	6	8	7	7	28
Hubbardston Nonsuch	W	7	8	8	8	31
Hurlbut	W	5	5	4	6	20
Irish Peach	S					
Jeffries	A	7	6	6	7	26
Jersey Sweeting	A	1	3	1	0	5
Jonathan	W	9	7	7	8	31
Kentish Fillbasket	A	0	8	8	8	24
Keswick Codlin	A	1	9	6	7	23
King of Tompkins County	W	8	10	10	10	38
Lady	W	9	0	1	9	19
Late Strawberry	A	7	5	5	7	24
Lawyer	W	5	7	4	5	21
Lord Suffield	A	3	8	6	7	24
Lord Duncan	A	2	9	7	6	24
London Pippin	W		8			
Lowell	A	5	7	4		
Lord Burleigh	A	2	9	5	0	16
La Rue	W	1	9	10	5	25
Maiden's Blush	A	3	7	7	8	25
Mann	W	4	7	6	8	25
Magog Red Streak	W	3	7	5	7	22
McIntosh Red	W	6	7	7	8	28
Melon	W	8	8	7	8	31
Minister	A	4	6	6	5	21
Monmouth Pippin	W	6	8	6	7	27
Mother	A	8	7	6	6	27
Munson Sweet	A	1	3	2	0	6
Newton Spitzenburg	A	7	8	6	7	28
Northern Spy	W	8	10	10	10	38
Newton Pippin	W	9	9	7	10	35
Ontario	W	9	10	10	10	39
Peck's Pleasant	W	7	7	6	8	28
Pennock	W	5	7	7	8	27
Pewaukee	W	4	8	8	8	28
Peach	A					
Phœnix	W	4	7	7	8	26
Pomme Grise	W	9		5	7	21
Pomme Grise d'Or	W	10		6	8	24
Porter	A	5	4	5	3	17
Priestly	W	4	5	6	7	22
Primate	S	7	6	6	0	19
Prenzea	A	9	9	5	5	28
Princess Louise	W	10	7	8	8	33
Pumpkin Sweet	A	0	4	1	0	5
Pumpkin Russet	A	1	6	4	5	16
Pomme Royale (see Dyer)						
Rambo	A	5	1	2	5	13
Rawles Janet	W	4	5	3	5	17
Red Astrachan	S	5	7	8	0	20
Red Belle-fleur	A	2	4	2	0	8
Red Canada	W	6	6	7	8	27
Red Cathead-	A	6	8	7	7	28
Red Russet	W	5	6	7	7	25
Red Bietigheimer	A					

Catalogue of Apples.—*Continued.*

Name.	Season.	Quality.		Commercial value.		Total value.
		Dessert	Cooking.	Home market.	Foreign market.	
Rhode Island Greening	W	8	10	8	8	34
Ribston Pippin	W	10	8	8	10	36
Roxbury Russet	W	6	8	8	9	31
Scarlet Pearmain	A	5	6	5	6	22
Shiawasse Beauty	A	7	6	6	0	19
Smith's Cider	W	1	4	0	1	6
Smokehouse	A	3	6	4	6	19
Sops of Wine	S	2	5	2	0	9
St. Lawrence	A	7	8	8	8	31
Stump	A	5	6	5	0	16
Summer Rose	S	6	6	4	0	16
Swaar	W	7	2	1	4	14
Swazie Pomme Grise (see Pomme Grise d'Or)						
Stark	W	2	2	7	8	19
Snow (see Fameuse)						
Talman Sweet		2	7	5	6	20
Tetofsky	W	1	5	1	0	7
Trenton	S	10	5	9	9	33
Twenty Ounce (see Cayuga Red Streak)	A					
Vandevere	A	6	5	4	6	21
Wagener	W	8	7	6	7	28
Wallbridge (see Edgar's Red Streak)						
Wealthy	W	8	6	9	9	32
Westfield Seek-no-Further	W	7	7	7	8	29
White Astrachan	S	1	2	1	0	4
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VI

THE ENTOMOLOGICAL SOCIETY.

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TWENTY-FIRST ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY OF ONTARIO.

To the Honourable the Minister of Agriculture:

SIR,—In accordance with the provisions of our Act of incorporation, I beg to present herewith the twenty-first annual report of the Entomological Society of Ontario.

The report contains an account of the proceedings of our annual meeting for the election of officers and the transaction of the general business of the society, which was held in the city of London on the 27th of August, 1890; it includes also the audited financial statement of the Secretary-Treasurer, the reports of the Council and Montreal branch, the President's annual address, etc.

I have also the honour to submit with the foregoing, several illustrated papers contributed by our members on injurious and other insects, which have been specially prepared for the information of the public, and are intended to assist our farmers and fruit-growers in contending with their insect enemies.

The Society's monthly magazine, *The Canadian Entomologist,* has been regularly and promptly issued during the past year, and has just completed its twenty-second volume. It continues to receive contributions from all the most eminent Entomologists in North America, and to circulate in all parts of the world. During the past year it has been found necessary to issue more than twenty extra pages in order to find space for the many valuable articles which have been furnished the editor.

It is a matter of profound thankfulness that our province, during the past year, has escaped from any serious insect attack. Those that have been specially noticeable are referred in the President's address, or described in the papers that follow.

I have the honour to be, Sir,
Your obedient servant,

W. E. SAUNDERS,
Secretary.

ANNUAL MEETING OF THE SOCIETY.

The annual meeting of the Society was held in its own rooms in Victoria Hall, London, on Wednesday, August 27th, 1890. A Council meeting was held in the morning at 10 o'clock, at which the following members were present:—The President, Rev. C. J. S. Bethune, head master of Trinity College School, Port Hope; Mr. James Fletcher, Ottawa; Mr. J. A. Moffat, Hamilton; Rev. T. W. Fyles, Quebec; Messrs. J. M. Denton, W. E. Saunders and Dr. Woolverton, London. The annual report of the Council was discussed and adopted, and other routine business was transacted. The Secretary-Treasurer presented his annual financial statement of the receipts and disbursements during the past year. The Council reported the purchase of a large collection of insects from Mr. Johnson Pettit, of Grimsby, which was deposited in the rooms of the Society. The arrangements for the formation of sections in different departments of natural science were laid before the Society by the President, and, on motion, duly approved and ratified. A scheme was submitted for the rearrangement of the work of the officers of the Society, in accordance with which Mr. J. A. Moffat, of Hamilton, is to take entire charge of the rooms, library and collections, and be a permanent resident official in London. A number of tenders for printing *The Canadian Entomologist* were received and considered; no decision was made at the time, but subsequently it was resolved that the tender of the London Printing and Lithographing Company should be accepted. Certain regulations regarding the library and the use of the rooms were drawn up and adopted.

In order to benefit members of the Society it was resolved that for a limited time the volumes of *The Canadian Entomologist*, III. to XXI. inclusive, should be sold at 75 cents each; the annual reports for the following years: 1874, 1880, 1882 to 1889, at 25 cents each; and the new lists of labels for Coleoptera at 25 cents per set, in each case strictly to members only. Applications for these publications at the reduced rates should be made to the Secretary.

It was resolved to separate the offices of Secretary and Treasurer, which have hitherto been held by one person.

ELECTION OF OFFICERS.

The following gentlemen were elected officers for the ensuing year:—

President—Rev. C. J. S. Bethune, M.A., D.C.L., Port Hope.
Vice-President—James Fletcher, F.R.S.C., Ottawa.
Secretary—W. E. Saunders, London.
Treasurer—J. M. Denton, London.
Directors—Division 1—W. H. Harrington, Ottawa.
  Division 2—J. D. Evans, Sudbury.
  Division 3—Gamble Geddes, Toronto.
  Division 4—A. W. Hanham, Hamilton.
  Division 5—J. A. Moffat, London.
Librarian and Curator—J. A. Moffat, London.
Editor of the *Canadian Entomologist*—Rev. Dr. Bethune, Port Hope.
Editing Committee—W. E. Saunders, London; H. H. Lyman, Montreal; Rev. T. W. Fyles, South Quebec.
Delegate to the Royal Society of Canada—Rev. T. W. Fyles.
Auditors—J. H. Bowman, H. P. Bock, London.

After the completion of the necessary business of the Society, the rest of the afternoon was devoted to the examination of the books and collections of the Society, and the consideration of specimens brought by the members. Among these may be mentioned some live ant-lions (*Myrmelionidæ*) brought from Indiana by Mr. Fletcher; a collection of *Plusias*, and other moths recently captured at Nepigon by Dr. Bethune, and some very interesting specimens of Lepidoptera, from the Province of Quebec, by Mr. Fyles.

The meeting adjourned at 6 p.m.

In the evening the Society held a public meeting in its rooms at 8 o'clock, which was largely attended by members and other friends from London and the neighbourhood. The Rev. Dr. Bethune, President of the Society, occupied the chair. After cordially welcoming those present, he proceeded to deliver the annual address upon the chief topics of interest in the Entomological world during the past year.

ANNUAL ADDRESS OF THE PRESIDENT.

Ladies and Gentlemen,—Fifteen years have gone by since I last had the honour of addressing the members of the Society as its President. So long a period of time has naturally wrought great changes in our comparatively small circle of members, as well as in the world about us; but I am happy to see here to-night some who were with us at our annual meeting in 1875, and to know that many others have continued ever since their active interest in the welfare of the Society and the advancement of entomological science. For twelve years the presidential chair was most worthily filled by our highly esteemed friend, Prof. Wm. Saunders, who only resigned it in order to devote his whole time and energies to the great and important work which he has undertaken as director of the experimental farms of the Dominion. His great success in this new office is well known to all who take an intelligent interest in the prosperity of our country.

The removal of Prof. Saunders from an active share in the work of the Society seemed a very serious blow, and was certainly a very great loss, but happily we were able to find a worthy successor in the person of our excellent friend, Mr. James Fletcher, Dominion Entomologist and Botanist, who has so zealously performed the duties appertaining to the office of president during the last three years. With such able men at its head during so long a period of time, it may be readily understood how substantial was the progress of the Society, and how high was the reputation it achieved both at home and abroad.

The past year has been in some respects an eventful one in the history of the Society. In the month of April last I learned that Mr. Edmund Baynes Reed was about to leave this province and take charge of the meteorological station at Victoria, British Columbia. He was one of the original members, and for more than five and twenty years an active and zealous officer of the Society, filling at different times the positions of vice-president, secretary-treasurer, auditor, librarian and curator. To his energy it is due that we have obtained so large and valuable a collection of scientific books in our library; he also contributed many excellent papers to our annual reports, while discharging various other useful functions in the interests of the Society. His removal from amongst us was so serious a matter that I came up to London to make arrangements for the future management of our affairs, as well as to say good-bye to an old and very dear friend. After much consultation with Mr. Reed and other members of the council, we devised a plan for the general conduct of the business of the Society which has been laid before you to-day, and which has resulted in the appointment of Mr. J. A. Moffat to the permanent charge of our rooms, library, collections, etc. It will be a great advantage, we are sure, in many ways, to have a qualified person to look after our possessions, and to be on hand at stated times for the admission of members to the rooms, as well as to discharge the other duties appertaining to the position to which he has been appointed.

While here in April last, a meeting of the local members of the society was held in order to consider a plan for the formation of sections which should include persons who took an interest in any department of Natural Science, and thus extend the operations of the society beyond the strict limits of entomology. The scheme which we agreed upon at that meeting was submitted to other members of the council for their approval, and has been fully ratified to-day. As its details have been laid before you already I need not repeat them here. It was very gratifying to learn that advantage was immediately taken of this arrangement, and within a few weeks active sections were formed with very satisfactory lists of members in the departments of Botany. Ornithology and Oology, Geology, and Microscopy. Many new workers have now joined our ranks, among whom we are glad to welcome a large contingent of ladies. A great impetus will thus be given, we trust, to the study of natural science in all its departments in London and the neighbourhood, and we hope that new life and zeal will be infused into the older as well as the later members by active co-operation in the field, the cabinet and the study.

Another matter upon which I may congratulate the society is the acquisition of the valuable collections of Coleoptera and other orders of insects, laboriously gathered together during many years by Mr. Johnson Pettit, an old and valued member of the society. Having ascertained that he was willing to part with his collections, I at once entered into correspondence with him, learned the sum for which he would be willing to transfer them to the society, and obtained the sanction of the members of the council for the purchase. Mr. Pettit was most reasonable in his terms when he understood the destination of the collections, and allowed us to have them at about half the price he would have asked from a private purchaser. Mr. Moffat did good service in the transaction by visiting Grimsby first to report upon the condition, quantity, etc., of the specimens, and subsequently by superintending their packing and removal to London. It is expected that during the coming winter he will be able in his capacity as curator, to dispose of many of the duplicates by sale or exchange for the benefit of the society.

I may turn now from the consideration of our own concerns to matters Entomological affecting the country at large, and following the example of my predecessors in their presidential addresses, refer to the work of injurious insects in the garden, orchard and farm. The most important insect pest that requires the careful attention of our farmers is the well-known Hessian Fly (*Cecidomyia destructor*, Say) Fig. 1, which has made its unwelcome appearance in several parts of the Province. The attacks of this insect upon barley, rye, and wheat, are seldom noticed at first, as the creature is so minute and works out of sight, sucking the sap of the plant from the stem, but concealed from observation beneath the sheath of the leaf. Its depredations are usually made known by the breaking down and falling over of the plant caused by the injury to the stem produced by the insect. There are two attacks in the year, one in the autumn, when the maggots may be found embedded in the crown of the root shoots of fall wheat; the other in the summer, when it lies under the leaf-sheath above the first or second

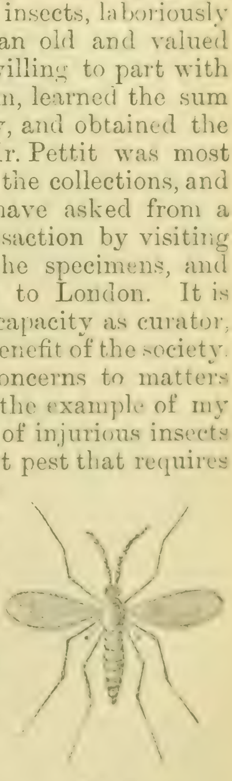
Fig. 1.

joint of the stem. When fully grown these larvæ harden and turn brown, resembling "flax-seeds" in shape and colour, and in this stage are well-known to observant farmers. The tiny smoky-winged midges themselves, the parents of the destructive maggots, appear in April or May, and again in August, but are seldom noticed, except by entomologists, as they are so excessively minute, and require a lens for their identification. The eggs are scarlet in colour and are laid inside the leaves of the food plant. The most effective remedies for this pest are (1). The late sowing of fall wheat; if this is postponed till about the last week in September the winged Hessian fly is gone before the young plant is sufficiently matured to receive its eggs; (2) The careful burning of all screenings and other refuse from the threshing mill; this will ensure the destruction of large quantities of the insect in the "flax-seed" state. It is well to do this whether the Hessian fly is known to be present or not; (3). The burning of the stubble after the crop has been removed; but if this is not practicable, it is well that the field should be harrowed in order to cause any fallen grain to grow at once and make what is called a "volunteer crop." This will be attacked by the fly as a suitable place for the deposit of the autumn eggs, and the brood thus producod can be readily destroyed by a later plowing after the maggots are hatched out; (4) If a field is found to be infested, care should be taken to have such a rotation of crops that neither wheat, rye nor barley should be grown upon the same ground for at least another year; (5). Good cultivation and plenty of manure will produce a strong, healthy growth and enable many a plant to survive an attack that would be fatal to a less vigorous one.

I have trespassed upon your patience to mention these well-known remedies because the subject is of such vast importance, and constant iteration is required in order that our farmers may be made familiar with the methods of treatment that have been found most satifactory. While much can be done to ward off the evil by an intelligent employment of these remedies, it is cheering to know that we do not entirely depend upon them for immunity, but that there are several minute parasitic insects which prey upon the Hessian-fly in its different stages, and in many instances prevent it from becoming a serious injury. During a recent visit to the central experimental farm at Ottawa, Mr. Fletcher showed me a number of plants of barley that were attacked by the Hessian-fly, but in nearly every one that we pulled up we found a parasitic insect closely associated with the enemy and evidently doing good work in its destruction.

Another insect that has been attacking grain in many parts of the Province is the Grain Aphis (*Siphonophora avenæ*, Fab.) As everyone who is in the least degree observant must be familiar with the appearance and habits of plant-lice, it is unnecessary to enter into any description of this insect here; it will suffice to say that it is found of different colours, green, black, yellow or red, and that it attacks first the leaves of the plant and then the flowers and tender young grain, often causing very serious damage. This year it has appeared in many localities in Ontario, but it was at once attacked by its insect enemies, notably by the larvæ and beetles of various species of "Lady birds" (*Coccinellidæ*), the grubs of Syrphus flies, and the *Aphidius*—a four-winged parasitic fly. These natural enemies speedily reduced the numbers of the plant-lice and prevented their attack from becoming serious.

Cut-worms, the larvæ of several species of night-flying moths, Fig. 2, (*Agrotis, Hadena, Mamestra*) have been abundant in all parts of the country, and especially injurious in gardens, but on the whole their attack has been much less serious than last year. This may perhaps be accounted for by the character of

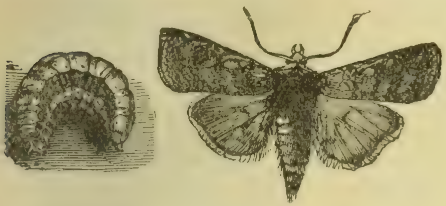

Fig. 2.

the season; the frequent rains during the spring and early summer causing a vigorous growth in the young plants and carrying them quickly beyond the reach of injury, while the wet weather would probably interfere greatly with the comfort of the Cut-worms and their ability to attack. The use of poisoned traps, as recommended by Mr. Fletcher in his address last year, has proved most effective wherever tried. I may repeat that they consist of loose bundles of weeds, clover or any succulent vegetation, which are tied together and then dipped into a strong mixture of Paris green and water, and scattered over the land three or four days before the crop is planted out or appears above the ground.

The Tent-caterpillars (*Clisiocampa*) which are usually so abundant and so injurious to fruit trees in spring and early summer have been remarkable for their absence or rarity, in all parts of Ontario. We hope, however, that all fruit growers and gardeners will be on the look out for them next spring and consign the webs and their inmates to a speedy destruction.

The Fall web-worm, Fig. 3, (*Hyphantria textor,* Harris) has been exceedingly abundant in all parts of the Province that I have visited this year. I do not think that this insect causes much serious injury to the trees it infests, as it comes so late in the season when the leaves have to a large extent discharged their function as regards the growth and health of the tree, but it is a great eyesore with its unsightly webs, and should be got rid of by every tidy fruit-grower. Nothing is easier than to strip off the web and its living contents with the hands, or when out of reach, by means of a pole with a swab of any kind tied to the end.

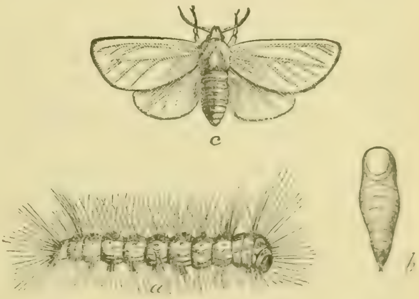

Fig. 3.

The larch saw-fly (*Nematus Ericsonii*), to which reference has been frequently made of late years, has not been nearly so abundant as usual in those parts of Ontario where it has hitherto prevailed. It is to be hoped that its natural enemies have multiplied to a sufficient extent to keep it in subjection and prevent its undue increase.

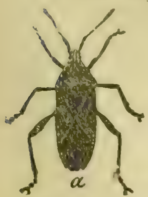

Fig. 4.

The squash-bug (*Coreus tristis,* De Geer), Fig. 4, has been very abundant and troublesome in many parts of Western Ontario this year. Where hand-picking and crushing under foot is impracticable, the insect may be readily destroyed by the application of a mixture of coal oil and sand, sprinkled over the stem and leaves nearest the root of the plant.

I have this year found a new insect enemy in the caterpillars of the beautiful wood-nymph moth (*Eudryas grata,* Fab.) Fig. 5 represents the caterpillar and moth. I have hitherto looked upon this lovely insect as an object of interest from its beauty and rarity, but this year

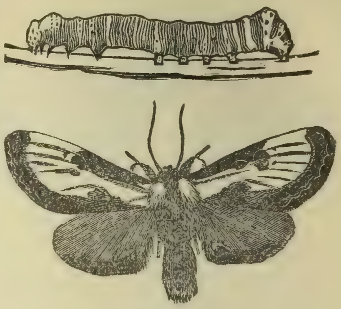

Fig. 5.

the caterpillars appeared in hundreds upon the Virginia creeper (*Ampelopsis quinquefolia*), which covers the front of our building at Port Hope with its graceful foliage. No attention was paid to these creatures at first, but it suddenly became apparent that they were rapidly devouring the leaves, and rendering most unsightly what was before a beautiful mass of green. They began their work near the ground and proceeded upwards, devouring the leaves as they went. On the 9th of August I had the infested creepers sprinkled with Paris green and water. One application sufficed to exterminate the insects, and none were afterwards to be seen. I have mentioned this instance particularly in order to bring before you the great advantage of using Paris green as a remedy for almost all leaf-eating insects—except, of course, those affecting cabbage and similar vegetables which are used as food. A judicious application of a very weak mixture will be found most efficacious. Proper care must, of course, be exercised when dealing with so virulent a poison. Its use as a remedy for the apple codling-worm and the plum curculio has now been fully demonstrated, and any fruit grower who will carefully follow out the directions published in our annual reports will, we are confident, be amply rewarded. It is a subject of no little gratification to us that fruit-growers in England have been at last persuaded to try this remedy, and in every instance that we have heard of the experiment has been crowned with success. It required two or three years of persistent effort on the part of Miss Ormerod aided by Mr. Fletcher to overcome the insular prejudice against adopting anything new and seemingly dangerous. Now that a beginning has been made, we hope for great results in the immediate future.

Before leaving this practical portion of my address, I wish to refer to a kindred, though not an entomological matter. I have noticed in many parts of Ontario an alarming increase of the fungus growth on plum and other fruit trees, commonly called the "black knot." An Act was passed by the Ontario Legislature a few years ago ordering the cutting down and burning of all infested trees, and imposing penalties for neglecting to do so; but the law seems to be a dead letter and no one apparently dreams of enforcing it. It would be well for our municipal councils to instruct their path-masters and other officials to look after the black-knot and enforce the law wherever its provisions are neglected. If this is not done there will soon be no cherry or plum trees left in the country, as the disease rapidly spreads, and when once it attacks a tree it is almost hopeless to attempt a cure.

Another fungus disease to which I may call your attention is the "downy mildew" of the grape. It is exceedingly injurious and very prevalent. Fortunately it may be readily checked by the use of the "Bordeaux mixture," and other compounds which fruit-growers have employed with great success.

Turning now to what I may call the non-economic aspect of entomology—though all investigations into the habits and distribution of insects have their practical bearing at some time or other—it is worthy of remark that butterflies have been extraordinarily scarce in Eastern Ontario this year. Whole days spent in collecting in localities where they were usually abundant have resulted in the capture of nothing worthy of mention. It is possible that the unwonted mildness of the winter, with its frequent changes from freezing to thawing, and the absence of snow, may have occasioned a great destruction among the hibernating forms of diurnal lepidoptera. I am the more inclined to give credit to this cause, as I found recently at Nepigon and Port Arthur, where the winter was quite as severe and prolonged as usual, butterflies were remarkably abundant, and could be found in hundreds whenever the sun was shining. Among other interesting captures at Nepigon, which has now become a famous hunting-ground, and where the butterfly collector, careering in hot haste with net in hand after a specimen, is not regarded as an escaped lunatic, as he would be in most parts of the country, but as a scientist engaged in quite as praiseworthy an occupation as trout-fishing—among my captures I may mention a number of specimens of *Plusia* belonging to several different species. As I only returned a few days ago I have not had time to get them identified, but I have brought several of them here for inspection. They were very active indeed upon the flowers of thistles and golden rod, flitting swiftly from one to another in the hot sun.

Since our last annual meeting many important additions have been made to entomological literature. Mr. Scudder's grand work on "The Butterflies of the Eastern United States and Canada" was completed last September. It forms three large volumes, containing 2,000 pages and nearly a hundred plates and maps, about forty of which are coloured. It is truly a magnificent work and a monument of patient labor and careful scientific investigation. However much we may differ from the author on such vexed questions as generic nomenclature, the sequence of families, and the like, we must express our unbounded admiration for his ability and learning, and the excellence of his work. The long pages of descriptive matter are enlivened by essays on all manner of subjects connected with butterfly life, written in a particularly charming style, and to each chapter is prefixed a stanza or two of poetry, so apt and so beautiful, that one is lost in wonder at the diversity and extent of the author's acquaintance with literature. This feature of the work renders it available for all lovers of natural history, even though they may take no special interest in butterflies. The author has published the work at a large pecuniary sacrifice. The list of subscribers is strangely small, but we hope that ere long librarians everywhere will find out that without a copy of Scudder's butterflies their collection of books is very incomplete.

Self-sacrifice in the publication of entomological literature is the order of the day. A similar tale has to be told of the authors of the next two books that I wish to refer to. Mr. W. H. Edwards continues to issue his lovely illustrations of the "Butterflies of North America." The coloured figures of these insects in all their stages are the most perfect and the most beautifully executed that I have ever seen. Nine parts of the third series have now been issued, and the tenth is almost ready; but at what a cost to the author! In order to accomplish this stupendous work he has been obliged to dispose of his collections and nearly all his books—a sacrifice that would be heart-breaking to most of us.

The other work to which I referred is the Rev. Dr. McCook's "American Spiders and their Spinning Work," the second volume of which has just been issued. When complete the work will consist of three large quarto volumes, profusely illustrated with wood cuts and some coloured lithographic plates. It is written in a most interesting manner, and while thoroughly scientific, is so popularly and clearly expressed that it may be read with ease and delight by any one who cares to learn about the strange habits and peculiar life-history of these singular creatures. When finished it will certainly be the most complete and perfect work on spiders in the English language. In this case, too, the author is publishing at his own expense and does not expect to be reimbursed for his outlay. All these works, I am glad to say, will be found in our Society's library and are available for the use of the members.

Serial publications on North American entomology continue to be represented by the *Transactions of the American Entomological Society*, Philadelphia; *Psyche*, Cambridge, Mass.; *Entomologica Americana*, Brooklyn, N. Y.; *Insect Life*, Washington, D.C., and our own *Canadian Entomologist*. Another addition has been made to the list this year by the issue of *Entomological News and Proceedings of the Entomological Section of the Academy of Natural Sciences of Philadelphia*. The working entomologist can hardly do without any of these publications; each one occupies its own special field, and all are valuable and interesting. Our own magazine, now in its twenty-second volume, continues to be issued with regularity, and, I am happy to say, receives contributions from all the most eminent entomologists in North America, and occasionally from others in Europe.

The study of economic entomology has been making vast strides during the last few years, owing to the establishment of experimental agricultural stations in all the States of the Union, and the appointment in many of them of a skilled entomologist. The bulletins issued from these stations and the central department at Washington are too numerous to mention in detail; they are replete with useful information and interesting records of experiments and observations. That the work is eminently scientific is shown by the names of those employed, for instance, Dr. Riley, Mr. Howard, Dr. Lintner, Professors Forbes, Cook, Smith, Fernald, Webster, Weed. These names, and many others, are familiar to us all as men of distinction in their several localities and departments.

In our own country much valuable work is being done by Mr. Fletcher, the Dominion Entomologist at Ottawa, not only by his investigations and the published results, but also by the addresses which he gives in different places to the meetings of Farmers' Institutes. He is in this way diffusing throughout the country a knowledge of friends and foes amongst insects, and the best modes of encouraging the former and exterminating the latter. The result of his work must in course of time be the saving of hundreds of thousands of dollars to the farmers and fruit-growers of the Dominion.

In England Miss Ormerod continues her unselfish devotion to the cause of economic entomology. Her annual reports are full of very valuable information, and have done much good in the mother land. It is gratifying to find that this department of practical work is being developed also in other parts of the British Empire. We have received a useful report on insect and fungus pests from the Department of Agriculture at Brisbane, Australia, prepared by Mr. Henry Tryon, of the Queensland museum, and several numbers of *Indian Museum Notes*, published at Calcutta by the Government of India Revenue and Agricultural Department. These "Notes" are edited by Mr. E. C. Cotes, and contain a large number of most interesting and valuable papers, both scientific and practical, illustrated with excellent engravings.

Before leaving this subject, I must not omit to mention the publication last autumn of a bulletin on the "Mediterranean Flour-Moth" (*Ephestia Kuhniella*, Zeller), prepared by Dr. Bryce, of Toronto, and issued by the Agricultural Department of Ontario. It is an excellent pamphlet and contains just what one wants to know about this new pest. The mischief referred to seems to have been stamped out, at least I have not heard of any further cases of attack in this province, and we may be quite certain that after the experience of last year, our millers will keep a sharp look out for the pest, and deal with it promptly should it show itself again.

I feel now that I have trespassed quite long enough upon your patience, and must bring my remarks to a close. The prospects of our Society are bright and cheering; we may well congratulate ourselves upon what has been accomplished in the past, and look forward with pleasant anticipations to the future. Let each member work honestly and faithfully in his own special department, and let us all unite in upholding the interests of the Society, and doing all that we can to increase its usefulness, maintain its reputation and ensure its success.

After a cordial vote of thanks to the President for his interesting address had been duly moved and seconded, Mr. Fletcher was called upon to give an account of the meeting at Indianapolis of the Entomological Club of the American Association for the Advancement of Science, to which he had been sent as delegate by the Society, and from attending which he had just returned. Mr. Fletcher stated that it had been an exceptionally good meeting, attended by a larger number than usual of eminent entomologists and botanists, and that its discussions were remarkably interesting and useful. The full account of its proceedings will be found in a subsequent part of this report.

The Rev. T. W. Fyles read a scholarly paper, entitled, "A Day in the Woods," which was highly appreciated by the audience.

The reports of the Council, the Montreal Branch, and the delegate to the Royal Society were read by the President.

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario beg to present the following report of their proceedings during the past year:—

The Society, they are happy to say, continues to prosper and maintain its usefulness. The membership is satisfactory and increased interest is being taken in its work.

The twentieth annual report on Economic and General Entomology was sent to the Minister of Agriculture in December last, and was printed and distributed in the following May. As it has been for some time in the hands of the members of the Society, it is unnecessary to refer particularly to it. It consisted of 104 pages, with 50 wood cuts in illustration, and was quite up to the average in the papers which it contained.

The *Canadian Entomologist* has been regularly issued at the beginning of each month, and is now approaching the completion of its 22nd volume. It continues to receive valuable contributions from all the leading entomologists in North America, as well as from some in Europe, and is regarded by scientists as a highly important magazine in the department which it occupies. The editor has found it necessary on two occasions recently to enlarge the number of pages from 20 to 24 in May and 28 in August, owing to the pressure upon his space.

After the disastrous fire at the University of Toronto in February last, the Council decided to present to the library a complete set of the *Canadian Entomologist* and the annual reports.

Several valuable additions have been made to the library of the Society during the past year, among which may be mentioned Mr. S. H. Scudder's "Butterflies of the New England States and Canada," which is now completed and bound, and the Rev. Dr. McCook's "Spiders and their Spinning-work," two volumes of which have thus far been issued.

In April last a meeting of the Society was held in London, with the president in the chair, at which plans were discussed for the formation of sections of the Society in other departments of natural science. The memorandum agreed upon at the time is herewith submitted for approval and ratification.

In consequence of the removal of Mr. E. Baynes Reed from London to British Columbia, to take charge of the Dominion Meteorological Station at Victoria, it will be necessary to make some new arrangements for the care of the library and collections, and the performance of the official work of the Society. The Council will submit a scheme for the appointment of a permanent officer in the person of Mr. J. Alston Moffat, of Hamilton, which they trust will be found to work satisfactorily, and to increase the usefulness and prosperity of the Society.

The Council desire to place on record their feeling of deep regret at the removal of Mr. Reed from this Province and the loss which the Society thereby sustains. Mr. Reed is one of the original members of the Society, and for more than a quarter of a century has been one of the most active and zealous of its officials, filling at different times the positions of vice-president, secretary-treasurer, librarian, curator and auditor. To him it is especially due that the library has grown to its present dimensions and value, and that so much progress has been made by the Society in many directions. The Council beg to thank Mr. Reed for his services in the past, and wish him all possible success and prosperity in his new and important sphere of labour.

During the month of May last arrangements were entered into for the purchase of the large collections in Coleoptera and other orders of insects made by Mr. Johnson Pettit, of Grimsby. The packing and transportation were superintended by Mr. Moffat, and the collections are now safely deposited in the rooms of the Society.

In accordance with our long-established custom, a member of the Council, Mr. Fletcher, has attended, as representative of the Society, the meeting of the Entomological Club of the American Association for the Advancement of Science, which has just been held at Indianapolis, Ind. Mr. Fletcher will submit a report of its proceedings.

The report of Mr. Lyman, the delegate to the Royal Society of Canada, and the report of the Montreal Branch, are presented herewith. The accounts of the secretary-treasurer have been duly audited, and will be laid before the Society.

Tenders for printing the *Canadian Entomologist* have been procured from several printing offices in London and Toronto, and are now laid before the Society for consideration.

Respectfully submitted on behalf of the Council.

CHARLES J. S. BETHUNE,
President.

REPORT FROM THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

BY H. H. LYMAN, DELEGATE.

As delegate from the Entomological Society of Ontario, it is again for the third time my duty to submit a short report of the work and progress of the Society during the past year, and I have much pleasure in saying that the Society continues to prosper and to maintain its high position among the scientific institutions of the Dominion and the continent.

The monthly magazine of the Society, the *Canadian Entomologist*, has been regularly and promptly issued during the past year and fully maintains its well known high character. The volume for 1889, which was the twenty-first volume, contained the usual 240 pages of reading matter, and had also one plate. The contributors numbered thirty-four and the articles were quite up to the usual standard of interest. One new genus, thirteen new species and seven new varieties of various orders were described in the volume, which also contained the complete life-histories of four species and partial ones of eight others. A series of papers on popular and economic entomology were also published during the year.

The annual report of the Society for 1889 to the Minister of Agriculture for Ontario has been published and contains many interesting papers of much importance to agriculturists, besides the usual report of the annual meeting and of the finances of the Society.

The annual meeting of the Society was held in Toronto on September 3rd, during the meeting in that city of the American Association for the Advancement of Science, which afforded our members the pleasure of meeting some of the distinguished entomologists of the neighbouring republic whose presence also added much interest to the meeting of our Society.

Our members also enjoyed the pleasure of attending the meetings of the Entomological Club of the American Association, presided over by our then President, Mr. Fletcher.

During the progress of these meetings it was resolved to form an "Association of Official Economic Entomologists" for the United States and Canada, which was accordingly organized and officers duly elected.

This movement is likely to have a very beneficial effect in securing greater co-operation among entomologists in official positions, and the annual meetings with the interchange of members' views cannot fail to be productive of much good. The library of our Society is in excellent order and was reported at the annual meeting as containing 1,052 volumes.

On account of certain provisions of "The Agriculture and Arts Act" of Ontario, recently passed, it was found necessary to make certain changes in the council of the Society, as the Act provides that all societies which receive aid from the Ontario Government must be governed by a board of directors who are residents of the agricultural divisions which they represent, the Entomological Society being permitted to group the thirteen agricultural divisions into five with one director for each. This Act will of course prevent any member of the Society residing out of Ontario holding any of the more important positions in the gift of the Society.

The following officers for the ensuing year were duly elected:

President—Rev. C. J. S. Bethune, M.A., D.C.L., Port Hope.
Vice-President—E. Baynes Reed, London.
Secretary-Treasurer—W. E. Saunders, London.
Librarian—E. Baynes Reed, London.
Curator—Rowland Hill, London.
Directors, Division 1—W. H. Harrington, Ottawa.
" 2—J. D. Evans, Sudbury.
" 3—Gamble Geddes, Toronto.
" 4—J. Alston Moffat, Hamilton.
" 5—J. M. Denton, London.
Editor of the *Canadian Entomologist*—Rev. Dr. Bethune, Port Hope.
Editing Committee—James Fletcher, Ottawa; J. M. Denton, London; Rev. T. W. Fyles, South Quebec; Dr. Brodie, Toronto.
Delegate to the Royal Society of Canada—H. H. Lyman, Montreal.
Auditors—J. M. Denton and E. B. Reed, London.

Early last month our Society, on the suggestion of the President, resolved to extend its field of operations by permitting the formation of sections for the study of other branches of Natural History, and sections have already been formed in Botany, Ornithology, Geology, and Microscopy, and joint field meetings of all the sections will be held regularly during the summer. This movement will, it is anticipated, strengthen the Society by bringing in many additional members. It is also hoped that arrangements may be effected to keep the rooms of the Society open daily.

The Montreal Branch, of which I have the honour to be President, continues I am happy to say in a prosperous condition. A number of new members have joined during the past year, and the monthly meetings have been regularly held and have been usually well attended.

Mr. Scudder's magnificent work on the Butterflies of New England, to which reference was made last year, was completed last October, and its issue marks an epoch in the history of North American Entomology.

The placing by Parliament during the past session, of books which have been published for twenty or more years upon the free list, is a measure of great importance to entomologists, as it removes a very burdensome tax upon men whose studies are seldom remunerative in a pecuniary sense, and will tend to encourage the bringing into the country of many valuable works upon this science which would not otherwise have been done.

REPORT OF THE MONTREAL BRANCH.

The seventeenth annual meeting of the Montreal Branch was held at the residence of Mr. Lyman on May 23rd, 1890, at 8 o'clock, p.m.

The following report of the Council was then submitted by the President:

SEVENTEENTH ANNUAL REPORT OF THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Council in presenting their report for the year 1889-90, can state with pleasure that the past year has been one of progress for the Branch, no less than six new members having been elected during the year.

The names of those added to our roll are Messrs. Chas. Jackson, P. M. Dawson, E. F. Baynes, Alfred Griffin, G. M. Edwards, and W. C. Adams; but of these Mr. Dawson has recently left Montreal to pursue his studies elsewhere.

During the year ten meetings have been held, one of which, viz.: that in June, held at the residence of Mr. Trenholme, in Cote St. Antoine, was primarily devoted to collecting nocturnal lepidoptera.

The following papers were read during the year :—

1. The North American Callimorphas; A Reply to Critics. H. H. Lyman.
2. Some Insects injurious to the Oak; F. B. Caulfield.
3. Notes on the Lepidoptera of Little Metis, P. Que. A. F. Winn.
3. A Trip to Mount Mansfield. H. H. Lyman.
5. Note on the Occurrence of Erebia Discoidalis at Sudbury, Ont. H. H. Lyman.
6. Notes on some species of Coccinellidae found at Montreal. F. B. Caulfield.
7. Entomology of Pittsfield, Mass. P. M. Dawson.
8. Note on the occurrence of Lepisesia flavofasciata at Ormstown, P. Que. H. H. Lyman.
9. Various notes on Coleoptera. J. F. Hausen.

Comparatively little field work was done during the collecting season of 1889, owing to the unusual scarcity of insects of those orders studied by the members, and though the prospects for this season are not as yet very encouraging, we may hope that more will be done, especially with the increased membership of the Branch; and it must also be remembered that even in an unfavourable season good work may be done in discovering the preparatory stages and foodplants of insects where these are unknown, or only partially known, as was the case last season in regard to Grapta J. album, which was bred by two of our members.

Submitted on behalf of the Council.

(Signed) H. H. LYMAN, President

The Secretary-Treasurer then submitted the financial statement, shewing a balance on hand of $8.77.

The reports having been adopted, the following officers were elected for the ensuing year: — President, H. H. Lyman; Vice-President, F. B. Caulfield; Secretary-Treasurer, A. F. Winn; Council, E. C. Trenholme and J. F. Hausen.

The President then read an interesting paper, " Notes on Argynnis freya A. Chariclea, and H. Montinus," dealing with the differences between these species and illustrating them by specimens.

(Signed) E. C. TRENHOLME,
Sec.-Treasurer.

ANNUAL STATEMENT OF THE TREASURER.

Receipts, 1889-90.

Membership fees	$229 53
Sales of *Entomologist*	110 89
" pins, cork, etc	144 54
Advertisements	13 1
Government grant	1,000 00
Interest	10 08
Balance from last year	121 73
	$1,629 96

Expenditure, 1889-90.

Printing	$431 75
Report and meeting expenses	154 15
Library	57 26
Purchase of collections, etc	318 52
Expense account (postage, stationery, etc)	91 69
Rent	80 00
Insurance	35 00
Grants to Editor, Secretary and Librarian	200 00
Cork, pins, etc	107 69
Balance	153 90
	$1,629 96

The President read the memorandum which was drawn up in April last regarding the formation of sections of the Society in various departments of natural science, and after giving an account of the enthusiasm with which the project was taken up by the naturalists in London, he congratulated the members on the success of the movement and hoped that it would long continue.

A paper by Mr. Frederick Clarkson, of New York, entitled "Observations from the top of a White Mountain coach," concluded the formal part of the meeting, and was listened to with much interest. At the request of those present, Dr. Bethune gave an entertaining account of the admirable work of Miss Eleanor A. Ormerod, the foremost economic entomologist of Great Britain, including pleasant reminiscences of his personal acquaintance with her.

The meeting then proceeded to discuss the locality and arrangements for an outing the next day, and decided upon visiting the banks of the River Thames a few miles below the city, where there is an excellent collecting ground.

Mr. Dearness, Mr. W. E. Saunders and Dr. Woolverton were next called upon to give a report of the procedings in the botanical, ornithological and geological sections respectively; their remarks were highly interesting and encouraging, and proved that the new departure made by the Society is an excellent one and must greatly redound to its success and prosperity.

After some congratulatory remarks by the President upon the admirable showing of the Society for the past year, the meeting adjourned.

A DAY IN THE WOODS.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

A day in the woods! What delightful reminiscences do the words awaken —recollections of bird-nesting and nutting expeditions, and of

"The days when we went gipsying a long time ago."

To the busy man, who loves business for itself, a day of relaxation can hardly be unwelcome; but to the man who leads a busy life, not from choice, but from stress of circumstances and for whom the wilderness and the solitary place have especial charms, how delightful is it to escape from his accustomed haunts, and "far from the madding crowd's ignoble strife," to look into the fair face of Nature, and to listen with loving reverence whilst she tells of many things.

It was with something akin to the feelings of such a man that on the 6th day of August last, I proposed to the young people at my house that we should have a day in the woods. The proposition was joyfully welcomed, a party was soon made up, the horse was harnessed, lunch baskets were packed, tin-pails for berrying were stowed away and forthwith we started. We drove along the cliff road to St. David's and then took a by-road leading to St. Henri's. Soon we came to a region of sand. Wherever the turf was cut by the wagon-wheels sand appeared. With change of soil, a change of flora and fauna may be expected. The first thing that took my attention was the multitude of tiger beetles frequenting this green lane. A sandy tract in which ant-hills are numerous is the favorite hunting ground of the cicindelidae, and in such a tract the mining operations of their larvæ may be easily carried on. Amongst the beetles that I noticed on this occasion, was the blue-black cicindela with the yellow clypeus

(*C. longilabris* Say), the rich rosy-purple (*C. purpurea*, Oliv.), (Fig. 6), and the deep bronzed-green (*C. limbalis* Kl.). My efforts to capture some of these aroused the curiosity of some *habitants* who were working in an adjacent field. At first they looked with the utmost astonishment at my proceedings, and shook their heads at one another as much as to say, *He is very far gone;* but soon a light seemed to dawn in upon them and there was a general clearing up, they came, in fact, to the conclusion that I and my party were bound on a fishing excursion to the Falls of the Etchemin, and that I was prudently laying in a supply of grasshoppers for bait. And shortly afterwards, when I had occassion to speak to them, I received respectful greeting and attention as one who *knew what he was about*. Resuming our journey we came to a region of second growth balsams, broken in upon by poorly cultivated fields in which blue-berry bushes abounded, and by tracts of green velvety moss dotted over with young pines. As we entered this region the passage of our vehicle disturbed a butterfly. " There goes *Neonympha canthus*," I said, but in a moment the thoughts of the incongruities of time and place for this induced me to leave my wagon and go in search of the insect, and soon I had the great delight of securing for the first time, a living specimen of *Debis Portlandia.* Gosse took this species many years ago at Compton, P. Que., and D'Urban in Argenteuil county, on the River Rouge. It has since been taken by Mr. Caulfield and Mr. Winn on Mount Royal, and by Mr. Fletcher in the neighbourhood of Ottawa. The insect is, however, rare in the Province of Quebec. In the course of a few hours I took two others specimens, dilapidated females. I found that the ovary of one of these had been quite emptied, from the other I obtained by pressure five pearly-white eggs, large for the size of the insect.

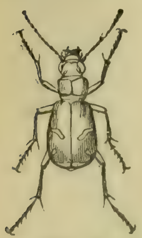

FIG. 6.

I did not find *D. Portlandia* difficult to catch. It has the habit of flitting for a few rods, and then settling on the trunk of a tree a yard or two from the ground, trusting it would seem for security to the similarity of its colours to those of the lichens that cling about the balsam stems.

In the glades and open fields *Argynnis Aphrodite* and *Argynnis Atlantis* were everywhere abundant, the latter being readily distinguished by their dusky beauty from their brighter companions. Whilst I was watching these active fritillaries, a butterfly of a different form came into the field. It proved to be *Grapta gracilis*. It was the only one of its kind that I could discover. Another good butterfly that I took on this occasion was *Thecla Titus*. This insect appears to be very widely distributed in Quebec Province. I have found it on Mount Royal, at Oka on the Ottawa, in the Eastern Townships and at Quebec, but solitary, or in pairs only.

Amongst the moths that showed themselves on this occcasion, I noticed two very perfect specimens of that showy insect *Arctia Saundersii*, (Fig. 7), also the beautiful Plusias, *Simplex* and *Precationis*. On the trunks of the trees *Pretophora truncata* was to be seen, and, of course, that ubiquitous insect *Drasteria erecthea* (Cram.) was constantly rising from the grass at my approach. The hour for luucheon having arrived, and my boy having kindled a fire and made the tea, the fruit gatherers were summoned and soon appeared laden with their spoils, raspberries, blueberries and the fruit of *Amelanchier Canadensis* (Torr. and Gr.), called by the French-Canadians *poires*. We sat down under a spreading beech, and amidst such

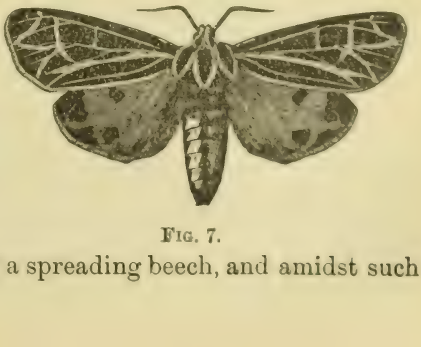

FIG. 7.

a beating of drums as the Queen of England holding high festival in Windsor Castle never heard, for it seemed as if from every tree *Cicada canicularis* was sounding its note. The tattoo of this insect increases in intensity for a while and then breaks off with a few disjointed beats. Now and then a sudden whir-r-r would be heard and the dark body of the bug would be seen shooting like a bolt to fresh vantage ground, the transparent wings of the insect being invisible against the blue sky.

After luncheon the most interesting discovery that I made was that of a species of Gelechia inhabiting galls on the white aster (*Diplopappus umbellatus* Torrey and Gray). The galls were found well up the stems of the plant, from a foot to two feet above the ground, and were smooth and onion-shaped. The largest specimens were five-eighths of an inch across. On opening the galls I found in several a brown chrysalis resting upon a web stretched across the interior. At the bottom was some decomposed matter, and near the top a neat round hole bitten through to the outer skin of the gall. In others of the galls I found a number of white shining grubs, blunt at one end and tapering at the other. Their length was about one line. I counted ten of these in one gall, and they were evidently consuming the remains of their host. In some instances the grubs had spun up into light drab cocoons.

In a few days I obtained from the galls four moths and two ichneumon flies. The latter were black with orange legs. The following is the description of the moths:

Length of body four lines, expanse of wings eight to nine lines.

Head white, eyes black, labial palpi recurved—first joint large and white, lower half of second joint white, upper brown with a white tip, antennæ filiform, light brown ringed with black.

Thorax reddish chocolate in colour; fore-wings rich chocolate red with a white divided fascia near the hind margin, under side grey; hind-wings pale silvery grey; fringes grey with a faint brownish gloss.

Abdomen golden yellow on the upper side of the three first segments, the rest light brown.

These moths differ considerably from those figured and described by Mr. Kellicott in Vol. X. *Can. Ent.*, p. 201, and from those described by Mr. Riley in the First Missouri Report, p. 172. I would suggest for them the name of *Gelechia gallœdiplopappi*.

The life of the Gelechia in its early stages is an interesting and suggestive one. The creature lives and toils in the narrow area of its prison-house, knowing nothing of the higher life and the glorious field for which it is destined, yet impelled by its instincts to make preparations for the change. Dire foes it has; and can it be that some violationof instinct,some erratic course on the part of the larva lays it open to the assaults of these? We know not, but possessed by these, it fails to attain to that nobler state of existence—which things are an allegory, suggestive to us of joys for which we yearn and evils which we fear.

Here as elsewhere this season I could not but notice the abundance of hairy caterpillars, Arctians of various kinds. A large proportion of these caterpillars had been overtaken with a strange disease—a sort of mange—and many had already succumbed to it. The warts upon the caterpillars had dried up, the bristles had blanched and loosened, the intestines had disappeared, and the outer frame of the insect had become spongy, the annules parted at a touch. The unfortunate insects were the prey of a fungus which has been identified by Dr.

Thaxter as *Entomophthora grylli var aulica* (Fres.) I am inclined to believe that the intense heat following upon the long spell of wet weather that we had in early summer induced the disease. Such an epidemic amongst caterpillars I have not witnessed since the time—some years ago—that the larvæ of *Pieris rapæ* were swept away by thousands.

Everywhere upon the choke-cherry bushes were to be found colonies of the little yellow, black-headed larvæ of the Tortrix (*Cacœcia cerasivorana*, Fitch). They bind the terminal leaves of the shoots together with a dense web, and carry on their operations under its shelter.

Of the Coleoptera but few specimens presented themselves. I took several of *Coccinella novem-notata* (Hb.), (Fig. 8) and one handsome Leptura, dusky yellow with a distinct black cross on the elytra. This Mr. Moffatt has identified for me as *L. subhamata* (Rand). The order of insects that was most numerously represented on this occasion was the Hymenoptera. Among the species I noticed were *Bombus fervidus*, (Cress), *Bombus ternarius*, (Say), *Bombus consimilis*, (Cress), *Anthophora bomboides*, (Kirby), *Andrena nivalis*, (Smith), *Vespa media*, (Oliv.), *Odynerus capra*, (Sauss.), *Eumenes fraterna*, (Say), *Crabro singularis*, (Pack), *Hedychrum violaceum*, (Lepelle), *Ichneumon grandis*, (Brulle), *I. lætus*, (Brulle), and the males of *Uroceros cyaneus*, (Fab.)

FIG. 8.

By this time the sun was getting low in the sky, and the voices of my young friends were, I fancied, a little less jubilant than they had been earlier in the day, and feeling the wisdom of not driving pleasure into satiety, I gave the word for the return. Besides my captures, we took back with us a large pailful of raspberries, another of blueberries and a smaller one of *poires*. All of which were afterwards preserved. So we hope that in the dark days of winter we shall be reminded, frequently and pleasantly, of our day in the woods.

OBSERVATIONS FROM THE BOX OF A WHITE MOUNTAIN COACH.

BY FREDERICK CLARKSON, NEW YORK.

On a journey through the White Mountains of New Hampshire, *en route* to Bar Harbor, Me., the past summer, I observed the following Lepidoptera: At Franconia Notch, altitude 2,014 feet, P. Turnus was abundant, constantly flying along the drive and in the woods bordering the road. At the Flume, altitude 4,500 feet, by wet places on the road as many as fifty were found congregated apparently enjoying the moisture. At greater elevations Turnus was rarely seen and above the timber line I failed to discover any Lepidoptera. At the Crawford Notch, altitude 3,134 feet, and through the Glen, Turnus was ever in sight, its brilliant yellow wings contrasting beautifully with the luxuriant green of these primeval forests. In thick woody places, and where the sun shone through in patches, the coquettish L. arthemis frequently appeared, ever alighting within your reach and ever darting away again with hide and go seek playfulness. A. Aphrodite with wings of "Silver bells and cockle shells" delighted the eye in its graceful flight along the road way between Jefferson and Fabyan, and C. philodice, (Fig. 9), rising with the dust at the horses' feet would encircle the coach, and then wander away to join its companions at the roadside brook. D. archippus,

FIG. 9.

(Fig. 10), the universal beauty, though not numerous in the White Mountains as early as the 11th of August, was occasionally seen flitting from flower to flower with all its well known elegance and dignity of motion. In a small cabinet at the Hotel Waumbek, at Jefferson, there is a single specimen of Chionobas semidea, (Say), captured on the summit of Mount Washington. This butterfly, says Scudder, feeds on sedges and lives upon the summit of Mount Washington; the genus containing several species, is, according to Packard, found on Alpine summits, and in the Arctic regions and on subarctic mountains. It must be a hardy insect to withstand the variable temperature of the mountain top. At the Summit House on Mt. Washington, the mercury on the 15th of July, at 5 a.m. stood at 47°, while a few days previous it was as low as 27°. At midday the power of the sun is felt, and the temperature is as high as that at a much lower altitude.

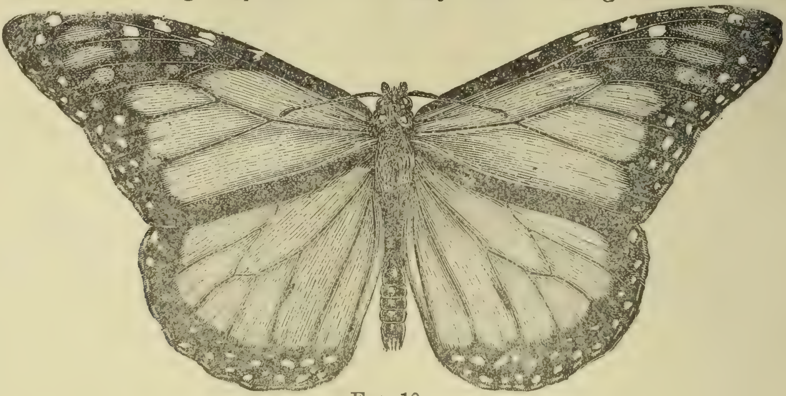

FIG. 10.

The cabinet, already referred to, at the Hotel Waumbek, Jefferson, contains the following Lepidoptera, the greater part being captures made at Bethlehem, which is at an altitude of 1,450 feet :

P. Turnus.
D. Archippus.
L. Misippus.
A. Aphrodite.
V. Antiopa.
G. Interrogationis.
C. Philodice.
P. Cardui.
S. Alope.
P. Cecropia.
T. Polyphemus.
A. Luna.
E. Grata.
S. do.
M. Quinque-maculata.
C. Piatrix.

The Profile House, at Franconia Notch, has also a collection of Lepidoptera. The cabinet contains the following, all of which were captured in the vicinity of the hotel, altitude 1,054 feet :

P. Turnus.
V. Antiopa.
P. Atalanta.
D. Archippus.
P. Cardui.
L. Arthemis.
A. Aphrodite.
C. Philodice.
P. Cecropia.
A. Luna.
S. Kalmiae.
S. Drupiferarum.
C. Ultronia.
A. Nessus.
A. Octomaculata.

A stray setter followed our stage from Mount Washington to the Glen and suggested an Entomological joke which I subjoin, and with which I close this record.

What is the name of your dog ?
Well, I call him Entomology.
Rather a queer name for a dog, isn't it ?
No, I think it singularly appropriate.
Why, Entomology is a science, and means a discourse on insects, in short, it is wholly and altogether a subject of insects.
That's just the reason why I call my dog Entomology, for he is wholly and altogether a subject of insects.

MEETING OF THE SOCIETY IN APRIL.

A meeting of the London members of the Entomological Society of Ontario was held in the rooms, Victoria Hall, London, on Friday evening, April 11th, 1890: the president, Rev. C. J. S. Bethune in the chair. The following resolutions were adopted:

That with a view of increasing the usefulness of the Society and furthering the study of Natural History and the kindred sciences it is desirable to follow the method of the Canadian Institute and the American Association for the Advancement of Science, and permit sections to be formed for the various branches of Botany, Ornithology and Oology, Microscopy, Geology, and such others as may from time to time appear to be desirable. The basis proposed is as follows:

1. All members of the sections shall be members of the Entomological Society and be governed by its rules and regulations and entitled to all its privileges.
2. Any five members may, with the permission of the Council, form themselves into a Section devoted to some special branch, and organize the same, appoint officers and make rules for the meetings, etc., the same not being contrary to the rules of the Society.
3. One-half of the annual fee of each member of a section shall be refunded by the Entomological Society to the Treasurer of that section for the use and benefit of the section.
4. All members of the Society shall be free to attend any meeting of a section and take part in its discussions, but only those shall be entitled to vote who shall have signed the roll of that particular section.
5. A member may elect to be member of one or more sections, but the one-half of the fees returned by the Society can only be paid to one section.

That it is desirable in the interests of the Society that some one should be found who would keep the rooms open daily and be in charge thereof.

The meeting then adjourned.

ORGANIZATION OF SECTIONS.

The following report is taken from the London *Free Press*, of May 5th, 1890:

A most enthusiastic meeting of Naturalists was held in the rooms of the Entomological Society on Saturday evening, for the purpose of organizing sections of the Society for the purpose of active work in the kindred branches of natural history. Sections were formed in Botany, Ornithology, Geology and Microscopy, with the following chairmen *pro tem*:—Botany, John Dearness; Ornithology, William Saunders; Geology, Dr. Woolverton; Microscopy, Prof. J. W. Bowman. Evenings were selected for organizing the sections and the meeting then adjourned. The Botanical section met at once and elected officers as follows:—chairman, John Dearness; vice-chairman, Prof. J. H. Bowman; secretary, Dr. Susannah Carson. The following persons signified their intention of joining the section:—Dr. Jennie Carson, Mrs. W. E. Saunders, Miss Edith McMechan, Miss Fowler, Drs. Hodge and Woolverton, Messrs. E. B. Reed, A. McQueen, A. O. Jeffery, S. H. Craig, Saunders, J. Balkwill, Kelley, A. Craig, R. Elliott and R. A. Gray.

The next meeting will be held on Saturday evening, 10th inst., at 8 o'clock, in the Entomological rooms at which it is expected there will be a large attendance of ladies as well as gentlemen. Mr. Dearness will give suggestions as to collecting and preserving plants, while the identification of plants collected during the week will be an item of special interest. The Ornithological section meets to-night in the Entomological rooms and a general invitation is extended to all interested in the study of Ornithology and Oology to attend so as to make the organization complete at once and ready for the season's study.

ENTOMOLOGICAL CLUB OF THE A. A. A. S.

The Entomological Club of the American Association for the Advancement of Science, assembled in the State House at Indianapolis, Ind., on Wednesday, August 20th, 1890, and began its regular sessions at 9 o'clock a.m., the President, Prof. A. J. Cook, Agricultural College, Mich., in the chair.

There were present during the meetings: W. B, Alwood, Blacksburgh, Va; Geo. F. Atkinson, Columbia, S. C.; W. S. Blachley; P. Carter; Prof. E. W. Claypole, and K. B. Claypole, Akron, Ohio; F. S. Earle, Ocean Springs, Michigan; S. G. Evans, Evansville, Ind.: James Fletcher, Ottawa, Ont.; H. Garman, Lexington, Ky.; Mrs. O. Hanney; C. W. Hargitt, Oxford, Ohio; Thos. Hunt; John Marten, Albion, Ill.; Miss Mary E. Murtfeldt and Miss Augusta Murtfeldt, St. Louis, Mo.; W. W. Norman; Prof. Herbert Osborn and L. H. Pammel, Ames, Iowa; R. S. F. Perry; C. Robertson, Carlingville, Ind.; Prof. J. W. Spencer, Athens, Ga.; James Troop and Prof. F. M. Webster, Lafayette, Ind.; Dr. Clarence M. Weed, Columbus, Ohio, and others.

THE PRESIDENT'S ADDRESS.

The President, Prof. A. J. Cook, delivered the following address on teaching entomology:

Ladies and Gentlemen of the Entomological Club.—I congratulate you that another year has passed, and our number has not been broken in upon by death. While our ranks have been much enlarged, no one has been called to that undiscovered country from whose bourne no traveller returns. I also congratulate you upon the great increment in our force of working entomologists. I think I may say, with no fear of contradiction, that no year in the history of America has been so remarkable in this respect as has the last. This is a cause for special felicitation, not only to entomologists, but to all our people. Ours is a tremendous country—by ours I include, of course, our Canadian brothers, for we, as scientists, know no line of separation—and to spy out the entire land needs an army of workers or observers, all trained to keen sight and ready apprehension. But more than this the magnitude of our country is fully equalled by the magnitude of the insect hosts, and to know all of these, with their full life history, requires an incalculable amount of closest research. But our business economy demands this for all our species: for so wonderful is the balance of nature, so close the relations of all species of life, that really we may hardly divide insects into those important and those unimportant in our agricultural economy. All are important; and so from an economic, no less than a scientific standpoint, it is desirable that all such research be widely encouraged, and it is a most hopeful omen—the rapid increase of earnest and trained workers. I shall not in this address occupy time by giving the peculiarities of the season in respect to insects, nor yet call attention to interesting discoveries, like the importation of the *Vedalia cardinalis*, All these will be brought out in papers and discussions. I must, however, refer to the new association for the advancement of economic entomology, which was organized at Toronto a year ago, and which held its first meeting at Washington last November. This meeting, under the Presidency of Dr. Riley, was a valuable one; and that society promises much for the science of entomology, as well as for its economic development. It is also a matter of much interest that a new paper—*Insect News* is started at that great centre of entomology—Philadelphia—which will also do much every way for our science. This, with the very excellent periodical *Insect Life*, published by the Entomological Division of the Department of Agriculture, can but give new impetus to entomological research. In addition to these, we have an addition to Prof. Comstock's admirable work, which when completed will form a most valuable adjunct in the development of entomology. If we may judge from what we already have, this will be invaluable in every entomological laboratory. When the Society of Economic Entomologists was organized a year ago it was remarked by one of our first entomologists that that move sounded the death-knell of this Club. I then remarked that such ought not to be the case. That Society is to be composed only of those interested in economic entomology, and of course will only put emphasis in the direction of the practical aspects of the science; this more or less of entomologists in a wider sense, and so will include those interested in practical entomology and also in the science without relation to utility. The Club then may well continue. I believe it will live and thrive, and will be most helpful to entomologists and to our science. While the other Association will discuss economic questions, this Club will place no limit on either its discussions or its membership, only so far as entomology shall be its aim and purpose. No one doubts but that he who has a thorough training in the science of entomology will be far better prepared for practical work, and so there can be only the most cordial relations between the Association of Economic Entomologists and this Club. Indeed, many of our most active entomologists will be members of both. I have already stated the truism that only can he do the best practical work in entomology who is thoroughly well grounded in the general science of entomology. As we now have a great call for entomologists in our experimental stations, agricultural colleges, and as State entomologists, not to speak of the fact that every farmer and fruit-grower would be more successful if he were well-informed in this science, it goes without saying, that there ought to be in training men for just such work. It seems to me that it needs no argument to show that our agricultural colleges are just the places where this training should be given. They were founded to teach those subjects which would be most serviceable on the farm. Entomology is one of the chief of these. Thus it follows that every student of agriculture should have a thorough course in this science, with the practical aspect of the subject kept in the foreground. In thus presenting this science to large classes—I have from thirty to forty each year who study this subject in the course—the teacher will find some in each class who are specially fitted to succeed. They enjoy the study and work most earnestly just for the love of the pursuit. They have quick observation, and are very accurate and honest in all their work. It needs no prophet to bespeak success in this field for such students. Our agricultural colleges are just the places to discover the men who have great possibilities in this direction ; just the places to give the training that shall best fit men to do the most valuable work. It will be my purpose in the remainder of this address to describe the equipment for such work, and to explain the method which I believe will give the best results. Of first importance is a good library ; this should contain all the standard works, periodicals and monographs, so that students who may decide to study any insect or genus, may find what has been written on the subject. Of course this cannot be had at once, but it is so essential that no effort should be spared to build up a complete entomological library at the earliest possible moment. *True* the scientist should study *things*, not books, but he will find a wide use of books most helpful in his study. Next to a library, such colleges should have good collections, which are often of more value than the library. A small show collection, illustrating the families and orders, and the several stages of the most injurious species of the place as well as the groups of beneficial ones should be open to the public. This will be studied and appreciated by the practical farmer, who, as he visits the college, will find it helpful, and will also interest and stimulate the under-class men, who will thus have their attention called towards insects before they commence the regular study, which will not occur till they are well along in the course. Drawing, botany, microscopy, and French and German, if thoroughly understood, will be great aids to the student who commences the study of entomology. Thus this study will come late in the course and the show collection will be whetting the appetite of the under-class men from the time they enter college until they commence the study. I would also have what I call a student collection—this is a pretty full collection from the locality of the college. This I would hang upon the wall of the lecture room, which I would have dark, except when in use, so as to preserve the colour of the specimens. I would have this in rather small cases, with glass in front and also back where it is desirable, as in case of Diurnals, to study both under and upper sides of the wings. This collection should show at least types of each group in all stages, from egg to imago, as well as nests, cocoons, etc. This is an object lesson ever before the student, is ever ready for use by the teacher to illustrate his lecture, and is at the disposal of the students in naming their own collections or in closer study of any group. It seems to me such a collection should be in every college. Lastly, I would have a laboratory collection which should be a biological collection, and the fuller the better. This is in large, tight, glass-faced drawers. I use the Harvard case. This is for the use of teachers and post-graduates who desire to study further in the science. It is too valuable for general use by the student or to be kept to satisfy general curiosity.

As I have before remarked, before the student commences the study of insects he should have had a good course in free-hand drawing, should have had instruction in the use of the microscope and in preparing microscopic specimens and slides, and if he has a ready use of German and French it will be very helpful to him in his study. It is also desirable that the student should have had a full course in botany. The students of our college have had three terms of botany, one devoted entirely to microscopic botany, before they begin the study of entomology. I consider this very valuable preparatory work. Entomology is very close precise work, and the laboratory work if carried on for a less space than three hours at a time is not satsfactory. But three hours of such close work is very wearying unless the student has had a fitting preparation. Thus I am pleased that our students have had *vertebrate dissection* with human and comparative anatomy and physiology before they commence entomology. I know this seems the reverse of the natural method; as nature proceeds from lower to higher; vertebrate dissection is lighter and less trying to eye and brain than is the study of insect anatomy; thus I am pleased to have Anatomy and Physiology of Vertebrates precede that of the Arthropoda in our course. In our college the student attends a course of sixty lectures on the anatomy and physiology of insects, systematic entomology and the economic bearing of the subject. These lectures are illustrated by use of models, the student's collection of insects, already referred to, by microsocopic preparations, mostly prepared at the College, and elaborate charts and drawings also prepared specially for our use. In connection with this course there are 36 hours of laboratory. Each student works three hours one day each week for twelve weeks. In this time they are able to study the internal anatomy, and to examine carefully and accurately one insect of each order. In connection with this several insects are traced to the genus by such keys as Leconte and Horn, Cresson, Williston, etc. Besides the above, each student makes a collection of from ten to twenty-five insects of each order, all neatly put up with date and locality label; each order by itself and all labelled as far as time will permit. Many students succeed in naming a large number of their specimens. Each student is also required to mount insects in all the approved ways. Small insects mounted on triangular pieces of cardboard or rectangles of cork with silver wires, while the larvæ are put in bottles of alcohol with rubber corks and also prepared by eviscerating and drying, while distended with air, in a heated oven. The students are also encouraged to prepare biological collections, in which they preserve the eggs, larvæ after each moult, pupa, cocoon, imago of both sexes, and of various sizes and the several variations. Some of our most enthusiastic students work out several such life histories, describing not only the separate stages, but the several parasites that work to destroy the insects. I regard this work as very valuable. It is excellent discipline for the mind and observation, gives accurate information of the most interesting kind, and arouses enthusiasm for the study as nothing else can. It is such work as this that will tell for the future of entomological research, that will make entomologists, who will honour alike the fields of pure and applied entomology. But such study ought not and will not stop here. Post-graduates will avail themselves of the opportunities which such laboratories offer. Last winter during our long vacation—ours is an agricultural college and our vacations must needs occur in winter, when farm operations are largely at a standstill—I had ten special students of entomology in my laboratory, one from South Dakota, one from Indiana, one from Ohio, one from Japan, one from Wisconsin, and the others from our own State. Nearly all were college graduates. Six special students, all graduates from colleges, have spent the year in my laboratory in special entomological study as post-graduate students. It seems to me that such are the young men who are going to develop the entomology of our country. They are the young men who can and will do grand work in our colleges and experimental stations. These young men each take up some special family or genus of insects, to which they give the major part of their time and study. They collect in all orders and give special attention to biological work, tracing the life histories of insects, identifying as far as possible the insects they capture and trying to become familiar with entomological literature, so far as they are able. The students are mutually helpful to each other. As the laboratory may be said to be a sort of perpetual Natural History, or more accurately Entomological Society, thus the students become familiar with the general laboratory work, in fact, they each become a factor in some degree in carrying the work forward. Here I will close by explaining briefly the mode of our labaratory work, which differs in some degree from the admirable plan which Prof. Forbes explained at the Washington meeting of Economic Entomologists last November. Our labels give in compact space locality, date, accession and species number. The accession number agrees with a number—serial number—in our accession catalogue for the special year. Thus, ac. 400 shows that the insect or insects bearing that label were the 400th collected during that season. The sp. number is given as the insect is determined, and is the number of the insect in the catalogue which we use. Thus, sp. 25 is " Cicindela purpurea," as the beetle is numbered 25 in Henshaw's catalogue of Coleoptera. In case the catalogue is not numbered, as is the case with Cresson's list of Hymenoptera, then we number it. We have a column in our accession catalogue for date, collector, person who named the specimen, and also for remarks.

This last column is wide, and in it we can usually write all necessary information which we received in the collecting. If we are experimenting with or studying the insect, our notes are kept on cards. These are numbered to agree with accession catalogue, and are kept in serial order until we know the species when we add the species number as well. We now index the card and place it in its correct alphabetical position in our card collections. Thus we can very easily find our notes on any specimen, either by accession number or by the name of the species. This plan works well, and, it seems to me, is very economical in respect to time. Of course our students all see this scheme and become familiar with its workings.

HESSIAN FLY, WHEAT-STEM MAGGOT AND OSCINIS.

Mr. J. Fletcher presented some notes upon injuries caused by the Hessian Fly, the Wheat-stem Maggot and an undetermined species of Oscinis. He said that the note was presented with the object of eliciting further information upon a subject which had proved of great interest to him. During the past season he had endeavoured to determine the number of broods of the Hessian Fly for the

Ottawa district, and had found, first, that the Hessian Fly, the Wheat-stem Maggot and Oscinis were all found at the same time and in the same plant, and further, that, speaking generally, they passed through their stages contemporaneously. Of the three the last had proved much the most destructive. From root shoots of wheat sown on the 14th of April he had bred Hessian Fly and Oscinis at the end of June, and a month later Meromyza had appeared. He had also noticed in some fields at Ottawa that a large quantity of spring wheat was attacked by Hessian fly in the ground shoots or stools in the same manner as fall wheat is attacked in the autumn. It was frequently the case that on plants which had made from fifteen to twenty stools but one would be left, all the others having been destroyed by the insects. He had procured adult Hessian Flies at Ottawa during this season in the beginning of May, at the end of June, and in August, and they would probably appear again in September. He had not been able to find the Hessian Fly breeding in any of the grasses, and would like to know if others had done so. Meromyza and the Oscinis had been most troublesome pests in the experimental grass patches at Ottawa, some grasses being almost exterminated by them. It was remarkable that the spring appearance of Meromyza had been so enormous as to have caused fear of a serious destruction of the wheat crop. As a matter of fact, however, there had been less injury, both to small grains and grasses, than for many years previously. This diminution he could only explain by the supposition that the eggs had been destroyed by some predaceous insect. The eggs must have been laid in large numbers, but there was very little evidence of the presence of the larvæ, either in the standing wheat or barley, or in the root-shoots of barley. The Oscinis he had been unable to identify; but, through the kindness of Mr. John Marten, of Illinois, he had learnt of some work which had been done by Prof. Garman in Kentucky, upon what was probably the same species. This, Mr. Marten said, had been doubtfully identified by Dr. Williston as *O. variabilis*.

Prof. Garman stated that he had studied what appeared to be the same species, and had prepared an article for publication. He also gave some notes upon the life history and anatomy of the insect.

Prof. Osborn had taken at Ames, Iowa, numerous specimens of Oscinis, one of which closely resembled that exhibited by Mr. Fletcher.

Prof. Alwood had studied in Ohio an Oscinis infesting oats, and had published his results in Bulletin 13, Division of Entomology. He had found the eggs, from two to eleven in number, were forced beneath the sheath of the leaf, and that just prior to pupation the larvæ gnawed through the epidermis and the pupa protruded so as to admit of the easy escape of the adult.

Mr. Fletcher, referring again to Meromyza, stated that in many instances he had found the eggs deposited in the field upon the upper surface of the leaf some distance from the stem, and asked if others had observed this to be the case elsewhere

Prof. Garman had found that the eggs were laid just above the sheath, or sometimes pushed beneath it.

Prof. Webster stated that the eggs of the Hessian Fly, had, in the spring of the present year, throughout Southern and Central Indiana, been deposited near the roots, the "flax-seeds" being found in that portion of the plant; while in the northern part of the State the case had evidently been different, as the "flax-seeds" were there almost invariably located about the second joint.

The Secretary read a paper by Mr. Edward L. Graef, of New York, upon the American Silk Worm Moths or Spinners, in which a serious attack upon the shade trees of New York by *P. cecropia* was recorded, and the suggestion made that this and other species might be turned to account, if any means could be devised for manufacturing and utilizing their silk. As a stimulus to this industry, Mr. Graef generously offered a prize of fifty dollars for the best essay and model of apparatus for carrying this suggestion into effect.

SECOND DAY'S SESSIONS.

The Club met on Thursday at 8 a.m. Dr. C. M. Weed read an interesting paper upon the clover-stem borer, *Languria mozardi.* Fifteen species of plants were reported upon which the larva had been found feeding. This paper was discussed by Profs. Cook, Alwood, Osborn and others.

Prof. Alwood spoke of tobacco insects, of which he was making a special study. He had observed a stem borer which was very injurious.

Dr. Weed had learned of a tobacco root-louse in Southern Ohio.

Prof. Garman spoke of the mouth parts of several species of some families of Thysanoptera, and stated that some recent studies had shown him that the figures published did not agree with his material. He then read the following paper, entitled " An Asymmetry of the Head and Mouth Parts of Thysanoptera."

In a brief paper in the Bulletin of the Essex Institute I have recently called attention to peculiarities in the structure of the head and mouth parts which set this group quite apart from other orders of Hexapoda. [This has no reference to affinities upon which, I believe, we are not prepared to pronounce until this and several other groups have been more completely studied.] In that paper it was claimed that the endocranium of the species examined was not symmetrical, being deficient on the right side ; that the labrum was one-sided ; that there was a developed mandible on the left side, with, at most, a rudiment on the right ; and that the mandibles of authors were probably lobes of the maxillæ.

At the time the paper was written I had not examined sufficient material to enable me to say whether the features pointed out were limited to certain species or were common to all members of the group. Since then many additional forms have been examined, all, however, belonging to the families Stenopteridæ and Coleoptratidæ, and in no case has there been found a departure in essentials from the structure of the head and mouth parts as they were described in the paper referred to. It is probably safe to assume, therefore, that the asymmetry noted is characteristic of these two families at least.

Of the group Tubulifera no representatives have been studied, I shall not be surprised, since this is the lowest of the suborders, if examples of Phlæothrips are found to be more nearly symmetrical.

As an interesting fact, though in no way related to the main purpose of this communuication, I may mention that the solitary mandible of Limothrips and Melanothrips is perforate, like the jaws of larval Chrysopa, of Dytiscidæ, and of Myrmeleon. In specimens of Coleoptratidæ examined, both labial and maxillary palpi are composed of three segments.

Note.—Since my return to Lexington from the meeting of the American Association I have secured a couple of very young Phlæothrips. My examination of these is not completed, but I have succeeded in demonstrating the single jaw on the left side. The parts are greatly elongated, and remind one of the same organs in Hemiptera. The styliform parts are especially long, extending, when retracted, into the cranial cavity towards the eye, thence bending posteriorly and extending along the posterior wall of the head to the mouth opening. Both mandible and styliform parts are perforate (or possibly grooved).

Two unmistakable tarsal claws are present in this genus. From their relation of position to the pads the latter would seem to be modified pulvilli.

Prof. Osborn was much pleased with what Prof. Garman had stated. He had also observed some of the points mentioned in a special study which he had made of these insects, and hoped Prof. Garman would publish his results as soon as possible.

Dr. Weed presented a short paper on the oviposition of *Listronotus latiusculus.* The eggs are laid in clusters of from five to ten upon the leaf stalks of *Sagittaria variabilis,* and are covered with small pieces of the epidermis which are nibbled off by the adult beetle. This was discussed by Messrs. Garman, Fletcher and Webster.

Mr. Charles Robertson, of Carlinville, Ill., read a most interesting note upon the habits of the bee *Emphor bombiliformis,* which was originally described by Creason as a *Melissodes,* but Paton, in revising the genus, raised it to *Emphor.* This bee, it was stated, confines itself almost exclusively to *Hibiscus,* chiefly *H. lasiocarpus.* The appearance and habits of the bee were described. It was stated that in collecting these bees it is important to catch those flying around the plant without alighting, as these were generally the males, whilst those visiting the flowers for honey and pollen were the females. On August 5th, when walking along a dam with water on one side, he had noticed a female standing upon the water ; she then flew to a bank, and he observed that she was carrying water to facilitate the excavation of hard ground, into which she was burrowing to build her nest. Sometimes one pellet of earth would be taken out after such an application of water, but at others three or even four. An interesting discussion followed which was participated in by Messrs. Osborn, Cook, Weed, Fletcher and others.

Prof. Osborn read the following note " On a Peculiar Form of Coleopterous larva ": Eleven years ago, while a student in college, I found a peculiar form of larva boring in the twigs of ash trees, and it was described at the time in the students' journal at the college (The Aurora, May, 1879, page 5.) under the caption " A Grub With Legs on its Back." The description is as follows : " The specimen was found boring in the pith of a small twig on an ash tree near the road west of the college, apparently beginning at or near the tip of the twig and working downward. Numerous twigs were found that had been inhabited in this way, but only one specimen of the borer was found—this about a quarter of an inch long, quite slim, and nearly white. Its great peculiarity consists in the disposition of its locomotive apparatus. The first three segments following the head are provided with the usual pair of legs, each in the normal position—that is, on the ventral surface. The following six segments are provided each with a pair of pro-legs, similar to those found on many caterpillars, but, strange to say, these are arranged upon the *dorsal surface,* exactly the opposite of the usual arrangement, while the number six is different from either the caterpillars, where there are four or five, or the saw-fly *larvæ,* which have eight. The remaining three segments have no propellers whatever. The beauty of this arrangement, for the conditions of the borer, can at once be seen, for it has as much foot-hold above as below. Placed upon a flat surface it could make no advancement, but wriggled awkwardly about, evidently seeking its double foot-hold. Placed between two thin plates of glass, it moved rapidly, using all its legs, and going with equal facility backward or forward, either side up. If provided with some support at one side it was possible for it to travel by means of the legs on its dorsal surface alone."

During the present season an example of a similar larva has come to my notice, specimens being first observed by Prof. L. H. Pammel, occurring in the stems of *Helianthus.* Their possessing similar locomotive organs upon the back called to mind the peculiar larvæ noticed years ago. They differ, however, somewhat in colour as well as in the plant on which they occur, and I find that they attacked voraciously dipterous larvæ that were living in the same stems. Whether they are normally carnivorous remains of course to be determined, but there can be no question of their attacks upon these larvæ, and apparently with the intention of obtaining food from them. These specimens are of a light bluish colour, possessing pro-legs upon segments 4-9, inclusive, and a pair of tubercles on the ventral portion of the anal segment, as well as a dorsal tubercle on the terminal portion of the same segment. In general appearance there is a striking resemblance to the *Languria* larva, as shown in figure exhibited by Dr. Weed, but in his drawing there is no indication of the dorsal feet.

The Club convened at 5 p.m., and considered the following resolution :—

Resolved, That it is the sense of the Club that the meetings of the Association of Economic Entomologists and of the Entomological Club would both be benefited by holding such meetings, if possible, at the same time and place as the meetings of the American Association for the Advancement of Science.

After discussion by Messrs. Fletcher, Osborn, Cook, Alwood, Weed and others, the resolution was unanimously adopted.

The Secretary read a paper by Prof. D. S. Kellicott, of Columbus, O., upon the "Preparatory Stages of *Eustrotia caduca.*" He had collected the larvæ upon *Nuphar advena* at Rives Junction, Michigan, in 1876. From these he had bred a moth, afterwards named by Mr. Grote *E. caduca* in the *Canadian Entomologist,* Vol. 8, p. 207. During July of the present year he had again collected the insect at Corunna, Michigan, and had succeeded in breeding and describing all the stages, which were submitted herewith.

The larvæ found in 1876 were feeding in the fruit but those studied during this summer were found upon the leaves. If these latter were floating, the larvæ were exposed on the upper surface, in other cases they were beneath or concealed in folds. A different habit of swimming to that of *Arzama obliquata,* which progresses by horizontal undulations, was noted. *E. caduca* swims strongly, but by an entirely different motion. The posterior third of the body is bent downwards like the tail of a crayfish and then quickly pushed backwards, thus driving the insect ahead by jerks.

Discussed by Messrs. Weed, Webster and others.

Prof. Cook reported having bred *Agrotis C-nigrum* through all its stages upon black currant, the eggs having been laid in a cluster upon leaves of that plant on 1st June—the perfect insect appearing on the 1st of August.

Prof. H. Osborn read a note on the "Period of Development in *Mallophaga.*" The habits of the species of *Mallophaga* render accurate observations upon the time required in development of the eggs a matter of considerable difficulty. While in some of the species upon very common birds it is possible to get an abundance of material, in other cases the opportunities for obtaining such material are very rare. But in the most common species the difficulty of determining the exact time of deposition of eggs, and then of keeping individuals in such conditions as to insure a normal development, makes positive observations difficult. This being the case, any observations which may add to our knowledge of the subject seem of interest, and the present note is offered as one such contribution.

The species chosen in the present case is the *Nitzschia pulicare*, which is almost invariably to be found in abundance on the common chimney swift (*Chœtura pelasgia.*) This bird is an abundant resident of the building in which my laboratory is located, and being readily obtained on occount of its tendency to fly in at the windows, I suggested to Mr. P. H. Rolfs, a graduate student in biology, that he attempt the rearing of larvæ from eggs with a view to determine length of developmental period in connection with studies of its embryology.

For this first purpose he secured on two separate occasions a number of the eggs, and kept them, part in a tight paste-board box, which was kept warm by the heat of his body, the others were enclosed in cotton-plugged tubes under a hen that was kept in the laboratory at the time for incubating eggs for embryological work. Of the first lot, all kept in pocket, secured July 27th, two eggs hatched August 4th, five between August 8-13th, one August 16th, the last giving twenty days, the longest period.

Of the second lot secured, August 3rd, six hatched between the 8th and 13th, four hatched August 14th (three in box and one in tube), two August 15th (one in box and one in tube), part not hatching, and the longest period in this case being thirteen days.

Assuming that those requiring the longest time had been deposited but a short time before the experiment began, we should have from fifteen to twenty days as the ordinary time required for the eggs to hatch for this species.

Mr. F. S. Earle presented some interesting notes upon the injurious insects of the season in Southern Mississippi. *Diabrotica 12-punctata* was a very abundant insect, and in addition to its well known food plants, it had been a serious pest to peach trees and cabbages. Leaves of the latter, bitten by the insect, at once decayed from the point of injury. Cut-worms were very destructive in gardens, and cucumber and melon vines were much injured by a plant-louse. Potatoes had been much attacked by a black flea-beetle, and the tomatoes by the boll-worm in the fruit, and on the leaves by the sphinx larvæ.

Prof. Cook would like to hear the experience of those present as to a practical remedy for the attack of the boll-worm upon the fruit of tomatoes.

Prof. Osborn said that Mr. Tracy had tried arsenical mixtures with some success, and also had attracted the perfect insects to light.

SOME EXPERIENCES IN REARING INSECTS.

Miss M. E. Murtfeldt read the following paper:

In rearing insects, as with many other enterprises in life, we climb the ladder to success by the rounds of successive failures, having in many cases to exhaust an almost infinite range of "how *not* to do it," before arriving at its happy converse.

Many and great are the disappointments of the entomologist; but does he succumb? Never! What single point in the biology of a species has been relegated to the absolutely undiscoverable? I do not know of one, no matter how obscure the subject or how little advance has yet been made in the direction of its elucidation.

"Hope springs eternal" in the breast of the entomologist, and patience and perseverance have in him their "perfect work," until Nature relents, or is caught "off guard," and the secret, so carefully hidden, is revealed.

I am tempted to enumerate some of the discouraging circumstances encountered by the biologist in this field.

Among the *Lepidoptera*, a majority of the *Bombycidæ*, *Geometridæ* and *Noctuidæ* adapt themselves readily to the conditions of the rearing cage. They accept the food provided and make the best of it, even after it has become a little dry, which must sometimes occur when the caretaker is pressed for time. They thrive in the closer and darker air, and take such exercise as they require within their narrow walls of glass and wire-cloth, and when the metamorphic impulse comes, they contentedly weave their cocoons in the corners of their prison, or bury themseves in the two or three inches of cemeterial earth in the bottom of the cage, and safely pass those mysterious transformations which give to this class of beings their pre-eminent interest.

But there is a great deal of individuality, or rather, specificality, in insects, and not infrequently specimens of larvæ are found for which the collector taxes his ingenuity in vain to provide. Not the freshest of leaves, the cleanest swept earth or the most well-aired of cages wiil seem to promote their development. They wander about the cage with an exhausting activity that pathetically suggests a realisation of their imprisoned condition. They nibble languidly at their food, and aimlessly spin mats of web in inconvenient places, over the cracks of the door or cover, for instance, and, before long, comes the morning, when they are discovered dead and discolored in the bottom of the cage, *and no more of them to be obtained until another season.* Or perhaps the cocoons are spun or the transformation to pupæ safely effected under ground, and the entomologist has full confidence that in due time he will obtain the much desired imago, and, when it may be expected, watches hourly for its emergence, and is rewarded by the appearance of an *Ophion* or a swarm of *Tachina* flies, or of some still smaller enemy, whose existence he did not even suspect.

Again, the collector may be obliged to delegate his cares temporarily to another, who, unused to the almost constant supervision necessary, suffers the precious larva to starve, or, by an oversight, tosses it out with the withered leaves, or crushes it in the hinges of the door, or, still more aggravating, thoughtlessly raises the cover and allows some long looked for imagine to dart out and escape through an open window. All that he will remember for the benefit of the person chiefly concerned, will be that it was a moth and "seemed something peculiar." As the entomologist cannot afford a separate cage for each species, and as he had probably put his choice unknown in with some well known forms of which he wishes simply to increase his duplicates, he probably grasps at the hope that the escaped insect was one of the latter, and so defers the full realization of his loss until weeks and months have passed and all his expected species have emerged, and then he hopes for better success another year, and finds "life well worth living" for this and similar reasons, which only an ardent naturalist can appreciate.

In some respects too much care is as subversive of success as too little. For instance, the very natural curiosity which the student feels to examine into the state of the insect after it has been buried for a short time in the earth. So he sifts the soil in his cage; and though he handles it with all caution, the frail earthen cell in which the treasure is enclosed falls in pieces, and the poor caterpillar in complete helplessness squirms in the loosened earth. Despairingly he tries with clumsy fingers to re-inclose it in the fragments of its cell, or attempts to form a substitute by packing the earth so that it may not be smothered. In vain. In ninety-nine cases in a hundred he never sees the imago.

While the hardy pupæ of most noctuids will bear any amount of handling, and by their activity will beat hard the earth about them at any time, a few species absolutely resent the least disturbance. I think that for seven or eight successive years Dr. Riley and I tried in vain to obtain the imago of a beautiful larva found every autumn in greater or less numbers on *Gnaphalium*, and occasionally on the Asters and some other *Compositæ.* Not being able to associate it with its species we designated it the "pretty cut-worm." It was Dr. Riley's practice to have the earth in his cages sifted occasionally during late autumn and winter to see how the pupæ were faring, and to have each species collected into its particular corner or side of the cage, which was designated by the label on the door.

But in the case of this particular species this orderliness was fatal. After Dr. Riley went to Washington, I resolved on the "let alone" policy. I put the larvæ into a cage with clean earth with an admixture of sand which I dampened slightly and only at considerable intervals during the winter, kept the cage in a very cool place, and the next summer was rewarded with several fine specimens of *Mamestra legitima*, my only disappointment being that it was a species by no means uncommon.

With me *Scopelosoma sidus* behaved in an almost equally capricious manner, but was, after many trials, finally reared by adopting the same methods as with *legitima.* I now make it a practice to sift or change the earth in my cages only in the spring and autumn before the hibernating pupæ are formed. Of course, if I wish to note pupal characteristics, I have to run the risk of the disturbance, but this is only occasional. I have found that frequent dampening when the cages are kept in doors, is also detrimental, and that hibernating larvæ and pupæ are far less likely to suffer from drought than from dampness.

In rearing the Micro-lepidoptera—in which I have an especial interest—various tactics must be pursued, and the imagination is often vainly taxed to suggest a provision which the delayed changes and general unrest of the insect plainly call for.

Under natural conditions it is very difficult to keep track of these small creatures. The leaves or flowers or fruits on which they may be found feeding on one day will be deserted by the next, and during the darkness they will have betaken themselves to parts unknown, the most assiduous search failing to discover them. In the rearing jar some species adapt themselves very kindly; others will crawl about for days spinning threads of silk over sides and cover and finally dry up without effecting their transformations.

An accident to which the student is liable, and against which he can with difficulty make provision, is to have the larva, which he has perhaps just described and figured, escape. How often have I taken up a bottle in which I had been rearing a particularly precious unknown, and found a tiny hole in the muslin cover, or perhaps a little flap cut at the edge of the bottle, telling only too surely of the loss and delay which a further examination verified. The annual brooded species which appear in the spring are the *betes noir* of the Micro-lepidopterist, especially such species as pupate on or just beneath the surface of the ground. They have to be cared for during the long, hot summer, as well as the autumn and winter, and to keep the safe middle course between the Scylla and Charybdis of drought and of the dampness which would promote the equally fatal mould, requires most careful attention. The annual brooded species which later fold or mine the leaves, or feed in the fruit capsules of various plants, or bore the stems, are comparatively easily reared, with a few exceptions. It was a number of years before I succeeded in obtaining the moth from an interesting larva which fed in the capsules of *Pentstemon.* This was owing to the peculiar change of habit during hibernation. After eating all the seeds from both divisions of the capsule, it would thoroughly line one all with silk, after cutting an aperture for escape, and ensconce itself, as might reasonably be supposed, for its winter's sleep. But no; the neatly lined cell was only a temporary abode, which, during the inclemency of mid-winter, was to be deserted for an entirely different one. Where, in the state of nature I have not yet been able to discover. In my rearing jars it perished, year after year, to my inexpressible disappointment, until finally I wintered a number out of doors in a small wire cloth box closed with a cork. From this collection I at last obtained the moth—a beautiful *Conchylis*—from a larva that had bored into and transformed within the cork. But for two or three years I had only the single specimen, and next to the aggravation of utter failure I rank the possession of an unknown unique. It may be new, and if sent to a specialist he will generally feel somewhat aggrieved if you reserve the right of description and further impose upon him the duty of returning the specimen. Then there is the danger of its destruction, either in the mail or express, to be braved, and yet, so long as one does not know the species, or be assured that it is new, one never can take full satisfaction in having bred it.

Last year I had the satisfaction of obtaining nearly a dozen imagines of the *Conchylis* in question by providing a number of bits of pith and cork in which the larvæ bored after their desertion of the capsules where they had fed.

Whenever I can make satisfactory arrangements for keeping track of them, I winter my Micro-larvæ and pupæ out of doors. Such species as bore the pith of stems are very easily cared for, and leaf miners and webbers I enclose on the surface of the ground, in some sheltered situation, under wire sieves or covers, bringing them in in the spring in order to have the little moths emerge where they can more easily be chloroformed or transferred to the cyanide bottle.

I must confess that I have never had signal success in rearing such species of the *Tenthredinidæ* as transform under ground. I have in mind more than half a dozen species—the larvæ of which are most interesting—of which I have so far failed to obtain the imagines, in spite of my utmost care.

The leaf and root-feeding beetles have always developed satisfactorily for me, but the *Cerambycidæ*, which feed on growing wood, have given me much trouble, and, in many cases, failed me utterly.

Orthoptera require but little care, as also do leaf-feeding *Hemiptera*, but the Cannibal species of both these orders are more difficult to cater to, and often refuse a diet that one would think would be irresistible. This is especially true of the carnivorous bugs which I have found require large space and ample provision to preserve them from fraternal rapacity.

With the aquatic orders I have had but little opportunity for experiment, but think they must furnish many very interesting subjects.

I believe that costly insectaries are being constructed by many entomologists, and no doubt will afford room for much thorough study of forms and habits. But such costly appliances are not absolutely necessary, and sometimes make observations more difficult than when the conveniences are more primitive.

A secure enclosure, fresh food, fresh air and clean water in the bottles are almost the only requisites in rearing the herbivorous species, and the more constantly the cage or jar is under observation the more thoroughly of course are the history and habits of the species revealed to us. When I wish to know all about a species, I keep the cage or jar on one corner of my desk and watch its occupant in the intervals of other work.

I cannot hope that I have conveyed much information in these notes to those who have gone over the same ground, but I am at least sure that I have recounted some of the experiences of every biological student of insect life, and can sympathise in his disappointments and appreciate the satisfaction of his successes.

THIRD DAY'S SESSION.

The Club met on Friday at 8.30 a.m. Dr. Weed presented a short paper on the habits of *Lixus concavus.*

As reported in the bulletin of the Ohio Experimental Station, Mr. Alwood had found this insect injuring the stems of rhubarb. During the past summer he had bred it from all parts of the stem of the common curled dock.

Prof. Alwood stated that he had observed the larvæ of *Gortyna nitela* eating those of *Lixus.*

Dr. Weed read a paper upon the habits of *Psephenus Lecontei.*

Prof. Webster and Mr. Fletcher also spoke on the habits of this beetle.

Prof. Hargitt read a note upon a large foliaceous gall which destroyed the tips of the stems of various species of *Solidago* at Bloomington, Indiana. In many instances as many as ninety-nine per cent. of the flower stems had been destroyed.

Prof. Hargitt read a note upon the Canker Worm. He said : "My attention was drawn to an orchard near Oxford, Ohio, which, for three or four years, had been seriously affected by this pest. In May, 1890, I went to examine the orchard and found it thoroughly over-run by the larvæ, many of the trees being actually dead, and several others in a very weak condition. The orchard, viewed at a distance, had the appearance of having been burned, the leaves being brown and dead. The trees were most attacked upon the outer rows, particularly those adjoining a wood. I recommended spraying with one of the arsenites, but it was too late for the present season. I observed several small birds in the orchard actually engaged in feeding upon the larvæ, amongst them the cedar bird, blue bird, summer warbler, chipping sparrow and field sparrow."

Prof, Hargitt also read a note upon *Cermatia forceps.* He had found that this Myriapod had become abundant in houses and the college building at Oxford, Ohio, during the past two or three years. He had experienced the same difficulty in keeping the insects alive in captivity, as was mentioned by Dr. Lintner in his 4th Report. He had succeeded in keeping them for several days and inducing them to take prey by keeping them in dark quarters in a tin canister during the day. When so confined they had fed freely upon house-flies, and other insects supplied them.

Prof. Webster spoke of the predaceous habits of *C. forceps*, and its special fondness for the Croton-bug (*Ectobia germanica*).

Mr. Fletcher had observed the insect when visiting Mr. Howard at Washington, D.C., who had described to him its remarkable habit of capturing the Croton-bug by springing over it and thus encaging it beneath its many curved legs. He was of the opinion that those who had failed to keep this insect in captivity had done so from omitting to supply a sufficiency of moisture, and thought that Mr. Hargitt's success in the instance mentioned, where the insect was put in a tin can, was more due to this cause than to the darkness. *Myriapods* are general found in damp, dark places.

ELECTION OF OFFICERS.

The Club proceeded to elect officers for the ensuing year. Prof. Cook, the retiring President, congratulated the members upon the harmony which had existed throughout the sessions, and was glad to find that, although some old and pessimistic members of the Club had predicted that it had run its course and would soon flicker out like a spent candle, he was glad to find that the present meetings had not only been the best attended for many years, but that the discussions and papers had been equally interesting to those of any meeting which he had had the pleasure of taking part in. He wished the Club every success and trusted that it would grow stronger and stronger every year. The following officers were elected :—

President, Prof. Herbert Osborn, Ames, Iowa.

Vice-President, Miss Mary E. Murtfeldt, St. Louis, Mo.

Secretary, Dr. C. M. Weed, Columbus, Ohio.

CONTAGIOUS DISEASES OF INSECTS.

Prof. Osborn, at the invitation of the President, introduced the subject of the use of contagious diseases in combating injurious insects. He said that he had already published a paper in the Transactions of the Eastern Iowa Horticultural Society for 1886, pp. 400-405, upon the subject; but that it was of such importance that he desired to hear it discussed by the members of the Club. He first mentioned the well-known fungus and bacterial diseases which attack insects, as Muscadine, Grassen or Jaundice, Pebrine, Flacherie or Flaccidity, Foul-brood of Bees, Fly and Grasshopper Fungus, and the White-grub Fungus, and called attention to the fact that we were already able to control those which affect important domestic species, as Silkworms and Bees, and that to some extent at least we are able to control those available as agents in destroying injurious species. After considering the various conditions limiting the applicability of this means, he drew the following conclusions :—

(1) That there are diseases amply sufficient as a basis for economic work, the bacterial forms giving the most promise for all cases where early results are desired, while those due to fungi, so far as present knowledge goes, propagating slowly, can only be used as slow but efficient checks to injurious forms, the most that we can do with them being to introduce them in localities where they are not already found.

(2) That the diseases can be controlled to the extent of preserving the germs for a season and transporting them from place to place to use for inoculation, but that their spread in nature will be affected by conditions beyond control, while only such insects as occur gregariously, or live in mingled hosts, can be attacked to advantage.

(3) That the cost of application would prevent its adoption except in certain forms.

(4) That we must oonsider this method of contending with insects at best as but one of a number of profitable methods to be used in certain cases where other methods are insufficient, and to supplement other methods when it can be done to advantage. With this end in view, the diseases of insects are worthy of the most careful study, and will not, he thought, disappoint the investigator in their final results.

Mr. Fletcher thought that the chief difficulty with regard to these fungus diseases was their cultivation so that they might be available at the time when needed. One trouble with him had been carrying them over the winter.

Prof. Hargitt spoke of a fungus disease which had attacked the canker worm.

Prof. Cook thought the greatest difficulty in making use of contagious diseases for the destruction of insects was the fact that the insects which it was desired to treat were not always in a susceptible condition.

Prof. Garman thought that although fungus diseases were difficult to introduce, bacterial diseases would probably be more controllable.

The meeting adjourned till 5 o'clock.

VARIOUS INSECTS.

Prof. Atkinson spoke on the "Injurious Insects of Alabama." A bud worm had been extremely injurious to young corn, piercing the central shoot and destroying its growth. *Diabrotica 12-punctata* had also been injurious in the same manner; and, if there were not sufficient food in the stem, the larvæ descended to the roots and tunnelled out irregular channels on the surface. They pupated in the ground. A new attack had been observed on the "Irish potato," viz., by the Cabbage Plusia, which had attacked the leaves. The same insect had been very injurious to cabbages. In the southern part of the State more had been done by the Plusia than by the cabbage worm. At Mobile farmers had complained that 50 per cent. of their melons had been injured by a worm. *Scolytus rugulosus* had been very abundant at Auburn in the spring, attacking trunks which appeared to be perfectly sound. Onions had been badly injured by a species of Thrips. Another species had also been injurious to cotton plants.

Prof. Cook stated that he had also seen a Thrips injuring onions in Michigan.

Prof. Webster stated that he had studied *Scolytus rugulosus* and had found that it invariably attacked trees which were injured. In a single instance, where the beetles had commenced operations on a sound tree, he found that they afterwards left it.

Prof. Cook made some remarks upon the effect of mild winters upon insect presence. He had found cut-worms and saw-flies very abundant in Michigan during the present season. He had also bred a new borer from the black currant, *i.e.*, the small longicorn beetle *Hyperplatys maculatus*. He had also found that the larvæ of *Aegeria typuliformis* had been largely destroyed by a fungus growth like that of the white grub. The leaves of cherry, pear and quince had been badly attacked by the larvæ of saw-flies, but they had been easily kept in check by applications of road dust.

Dr. C. M. Weed presented a paper upon the "Oviposition of *Dectes spinosus* upon *Ambrosia trifida*." He also gave some account of the insect, in all its stages, from specimens which he had bred.

During the meeting a most interesting set of photographs was exhibited by Prof. Webster, showing a likeness of Thomas Say, his birthplace, the house where he lived during the greater part of the time he was writing his works, his tomb and an autograph. Prof. Webster had a few sets of the photographs struck off when his own were printed and is willing to let entomologists have them at the actual cost of production.

AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS.

The second annual meeting of the Association was held at Champaign, Illinois, in room 6 of the University of Illinois, beginning November 11th. The following officers and members were present during the meeting:

President, C. V. Riley, Washington; 1st Vice-president, S. A. Forbes, Illinois; 2nd Vice-president, A. J. Cook, Michigan; Secretary, John B. Smith, New Jersey. J. M. Aldrich, S. Dakota; W. B. Alwood, Virginia; G. F. Atkinson, Alabama; M. H. Beckwith, Delaware; James Fletcher, Ottawa, Canada; Lawrence Bruner, Nebraska; H. Garman, Kentucky; C. P. Gillette, Iowa; F. W. Goding, Illinois; C. A. Hart, Illinois; F. L. Harvey, Maine; L. O. Howard, Washington; John Marten, Illinois; Herbert Osborn, Iowa; F. H. Snow, Kansas; H. E. Summers, Tennessee; Roland Thaxter, Connecticut; F. M. Webster, Indiana; Clarence M. Weed, Ohio; C. W. Woodworth, Arkansas; E. F. Goff, Wisconsin.

Several others interested in entomology, not members of the Association, also attended the meeting, giving an average attendance of about 20 at every meeting.

The secretary read his report and submitted some letters for action by the Association.

On the motion of Prof. Cook it was decided that an assessment of 25c. should be made from each member attending the meeting to defray the necessary expenses.

The committee on co-operation (Profs. Riley, Cook, Forbes, Comstock and Lintner) reported progress and was continued.

The requisites of membership were discussed and Drs. A. S. Packard, D. S. Kellicott and Messrs. J. M. Aldrich, E. V. Wilcox, C. A. Hart and A D. Hopkins were placed on the list of active members. Mr. E. W. Doran was elected an associate member,

The constitution was amended by striking out the provision allowing special meetings to be called at the request of members.

SECOND DAY'S SESSION.

On November 12th 29 members were present, including some ladies, and the Hon. Edwin Willits assistant secretary of agriculture for the United States. The president, Prof. Riley, delivered his annual address on "The Outlook in Applied Entomology." This address was a masterly effort and was intently listened to by all who had the good fortune to hear it. It will be published in full in the pages of Insect Life.

Mr. James Fletcher, of Ottawa, spoke in high terms of the paper. He said: "You have drawn our attention to the fact, Mr. President, that this is the most remarkable meeting of economic entomologists which has ever met together, and I feel sure, sir, that everyone present will agree with me that your address is one of the most remarkable we have ever had the privilege of listening to. You have covered so much ground and spoken upon so many subjects on which we know you to be the highest authority, not only from the exceptional advantages you possess from your official position, but also from the experience you have gained from earnest and close attention for a quarter of a century to this special subject which we have gathered together to-day to discuss, that if we heard nothing else we should be well repaid for the trouble of attending this meeting. This great knowledge makes you *facile princeps* the most eminent living economic entomologist—a title to which, on account of the work you have done in developing the science of practical entomology, no one will dispute your claim. The present meeting being a joint one of the Association of Economic Entomologists and of the Entomological Committee of the U. S. Experiment Stations leads me to make these remarks, because probably the question which is most engaging the attention of many of us at the present time is whether any good purpose will be served by maintaining both of these organizations. We know that the Committee of the Experiment Stations must meet if the directors of stations order it ; but I feel confident that the necessarily limited number of entomologists in that committee, even if every station eventually employs such an officer, cannot do such good work for the science and give them equal opportunities, to those offered by an organization of the nature of the Association of Economic Entomologists, which will include many eminent men who are excluded from active membership by the rules of the committee. I refer to such men as Prof. Riley and his assistants, Dr. Packard, Mr. French, Dr. Lintner, and hosts of other economic entomologists in the United States as well as the Canadian entomologists and many others who would be pleased to join in various parts of the world. I submit to the meeting that there is room for good work from both of these organizations and that it would be extremely ill-advised to let either of them drop to the ground for each should be of the greatest assistance to the other. I believe, too, that to no one can the Association be of more use than to the Experiment Station Entomologists, and therefore they should make every effort to sustain an association at the meetings of which they must always have greater freedom than they can have in the committee, where the proceedings will always be subject to a certain degree of restraint, both as to the time allowed for discussion and the subjects brought forward. The Entomological Committee is specially a meeting of the Entomologists of the Experiment Stations and any one else will always, to a certain extent, feel himself an outsider no matter how cordially the hand of friendship may be extended to him. The president has stated that he does not care where the work is done so that it is carried on vigorously. This is probably the case, and the gentlemen I have mentioned have very little to learn from the meeting compared with the advantages which will accrue to us from having such men present at the meetings. I cannot help thinking that we shall make a serious mistake if we allow an organization to drop which will ensure us their sympathy, attendance and services and will at the same time form a bond of union between the economic entomologists of the whole world.

The address was also highly complimented by Prof. Cook, who spoke of the advantage of co-operation between the Association and the Committee of the Experiment Stations. He suggested some ways in which these two organizations could be mutually beneficial.

Prof. John B. Smith thought there was no necessity to have two bodies composed of nearly the same members meeting on the same days and at the same place and covering the same ground. He strongly advocated an effort being made to gain from the Association of Agricultural Colleges the same advantages for the entomological committee as were at present offered by the Association of economic entomologists. This, he thought, would be of advantage to station workers, at least, as it would give them a recognized place in the official body of Agricultural Colleges and Experiment Stations.

Dr. C. M. Weed thought that there was some misunderstanding as to the status of some of the gentlemen who had been mentioned. The Canadian Experiment Station was represented in the main body and its officers have the same rights and standing in committees as have those of the other stations. The Department of Agriculture is equally represented both in the main body and in the committees.

In reply to Prof. Smith, Mr. Fletcher said that there was no intention of always having the meetings of the Association of Economic Entomologists at the same time and place as the Committee of the Association of Agricultural Experiment Stations. The place of meeting would be decided annually. As to covering the same ground, if the Association of Economic Entomologists continued to exist, it would draw into its membership entomologists from all parts of the world while the committee could only contain the entomologists employed at the various experiment stations. In answer to Dr. Weed he was sure that others than experiment station entomologists would always feel themselves to a large extent outsiders.

Prof. A. J. Cook of Michigan, read a paper on " Work of the Entomologists in Experiment Stations," in which he gave his ideas of the manner in which bulletins should be prepared and detailed his own method of reaching the agricultural public.

There was an interesting discussion on these subjects participated in by Messrs. Woodworth, Harvey, Weed, Smith and Aldrich. Dr. Weed spoke of the plan of furnishing articles to the manufacturers of the plates known as " patent insides," which get a large circulation in rural papers.

Prof. Smith thought the best way to reach farmers was attending and delivering addresses at farmers' institute meetings.

There was considerable discussion as to the advisability of using old and well known information in bulletins. It was, however, generally conceded that this was necessary so as to make the bulletins of the greatest use to agriculturists. Frequently well known insects appear in destructive numbers and it is necessary to give their complete life history.

Prof. J, B. Smith spoke on " Fertilizers as Insecticides," giving his experience with Kainit, and muriate of potash. He spoke highly of their use against cutworms and species of aphides which worked beneath the surface of the ground.

Prof. Riley gave some of his experience with ashes and other materials containing potash. Mr. L. O. Howard read a valuable and extremely interesting paper on " The Habits of Pachyneuron," which demonstrated the good work which is being done by the entomologists of the Division of Entomology at Washington, The question of breeding these and other hymenopterous parasites was discussed by Messrs. Howard and Harvey. In answer to questions from Messrs. Harvey, Fletcher, Cook and Summers, Mr. Howard gave instructions as to the best method of rearing, mailing and mounting specimens.

Mr. Smith read some notes on the Plum Curculio in which he gave the results of some observations upon eggs laid in apples. He found that the larvæ came to maturity only in such fruit as fell from the tree. He was therefore of the opinion that it was necessary for it to be in a state of partial decay. He had found the characteristic injury and larvæ of the curculio in the young fruit of *Amelanchier Canadensis.* He pointed out the importance of collecting and destroying all fallen fruit.

This subject was spoken on by Messrs. Beckwith, Harvey, Gillette, Woodworth, Cook and Fletcher. Prof. Smith gave also " an experience with the Rosebug," giving an account of serious injury by this insect in Southern New Jersey during the past season. All remedies tried had proved of no avail on account of the enormous numbers of the beetles. He had used pyrethrum, copper fungicides, kerosene emulsion, tobacco, whitewash. The greatest measure of success had followed the use of a " slodge soap." He believed the only remedy for grapes was to bag the bunches.

Messrs. Howard and Alwood made remarks on this subject and the meeting adjourned.

THIRD DAY'S SESSION.

On November 13, there was a morning meeting of the association; 21 persons present. The president announced that the first business of the meeting would be the election of officers for the ensuing year. The following were elected: President, Mr. James Fletcher, Dominion Entomologist of Canada; 1st Vice-president, Prof. F. H. Snow, Kansas; 2nd Vice-president, Prof. Herbert Osborn, Iowa; Secretary, Mr. L. O. Howard, Washington, D.C.

The advisability of all members of the association sending their bulletins to other members was brought up and there was a unanimous expression that this should be done. This will not only be a means of apprising each of what others are doing, but will act as a bond of union amongst the members of the association.

It was decided after some discussion to hold the next meeting of the association at Washington, D.C., beginning just before the meeting of the American Association for the Advancement of Science.

The constitution was amended by striking out the word "official" in the title, and an amendment was submitted abolishing the distinction between official and non-official members as to rights and privileges.

Prof. Smith read a paper entitled "Some questions relating to Aphides." Great stress was laid upon the value of the poriferous system of the antennæ of the winged forms in distinguishing species. Only by these characters could the adults of *Aphis mali* and *A. maidis* be separated. The poriferous system of a wingless viviparous female of any species was always like that of the larval form —from this Prof. Smith considered that the process known as "gemmation" was a case of true reproduction by larvæ.

The matter was discussed by Messrs. Webster, Howard and Osborn who agreed with this pretty generally accepted theory.

Prof. C. P. Gillette read a paper—"Notes on the Plum Curculio and Plum Gouger," in which he detailed his observations relative to the egg-laying habits of the two insects. Mr. Lawrence Bruner spoke on "beet-root insects." The increased area under sugar-beet in the State of Nebraska had rendered a study of the insects attacking this crop a necessity He gave a list of all the species he had found attacking the plant.

Mr. Fletcher asked if any practical remedy had been devised for the Anthomyian fly which mined in the leaves of beets and mangolds.

None of those present had had any experience with the insect in injurious numbers.

Mr. Howard asked whether the European pest of the beet-root (*Silpha Opaca*) had be enobserved by Mr. Bruner or any one else as occurring in America.

Mr. Bruner had not noticed it.

Mr. Fletcher expressed interest in the life-history of the Collops beetles and asked if anything was known concerning them. He had only taken them when sweeping grasses. Prof. Smith had taken them on Solidago.

Mr. Smith related his observations on "an invasion by the Clover-leaf Beetle." This had appeared in great numbers in New Jersey during the summer but was entirely exterminated by a fungous disease.

Mr. Howard mentioned a similar attack in Pennsylvania where the insect had developed a fondness for timothy (*Phleum pratense.*) Specimens were sent to Washington and caged over this grass, upon which they were observed to feed.

Mr. Woodworth mentioned that he had observed in Arkansas three epidemics amongst insects which were so severe as apparently to exterminate the infested species: one of these was the tomato worm.

Mr. Fletcher asked whether *Phytonomus nigrirostris* had been observed as injurious to clover. He had frequently found the larvæ feeding on the heads of clover as well as the characteristic cocoons. He had found it in many parts of Canada, but upon one occasion, as recorded in his report for 1884, it was injuriously abundant at Dalhousie in New Brunswick. Mr. Gillette also spoke on insects injurious to clover.

Prof. Smith gave an account of some experiments with preservative fluids. He had found a mixture of equal parts of acetic acid and alcohol very satisfactory both in regard to preserving form and colour of delicate insects.

The subject was earnestly discussed by all present as being a subject of much importance. Mr. Woodworth gave as a method which he had found satisfactory for larvæ, to kill in water heated to 90° centigrade: leave from 1 to 5 minutes; then put in alcohol 35° 1 to 2 hours, 50° from 6 to 8 hours, 75° for 24 hours or more and then to absolute alcohol. This would usually preserve perfectly and was a recognized process for hardening and preserving for histological purposes.

Mr. Fletcher asked whether in the case of large larvæ it was necessary to puncture the epidermis so as to allow the preservative fluid to penetrate.

Mr. Woodworth answered that this was not often necessary.

Mr. Fletcher spoke of a large series of the larvæ of *Sphinx chersis* which he had taken during the past summer upon various species of *Fraxinus*. They varied so remarkably in colour that he was able to separate about 40 which showed different markings from the usual glaucous green to a rich vinous purple with yellow epidermal dots. He had placed them in a jar of 35° alcohol and had found that those at the top were very much discoloured and that those lower down were less so, those at the bottom being of good colour. On placing some in stronger alcohol the discoloration was intensified. He thought the discoloration was due to the gradual decay of the central portions of large larvæ, but could not understand why those at the bottom were less discoloured than those at the top of the jar.

Prof. Forbes stated that he used the method described by Mr. Woodworth in his laboratory and found it fairly successful. It does not preserve greens well, but browns are preserved and the markings are well shown.

Mr. John Marten said that hot alcohol was a convenient way of preserving specimens by this method and that it answered equally well as killing in hot water.

Prof. Forbes read a "Summary history of the corn plant louse.' This was an intensely interesting paper and gave the results of continued observations for some years by Prof. Forbes and his assistants. It gave the life-history both above and below the ground. The relations existing between the aphis and the ants which were always found in company with it were explained and suggestions for remedies based on these observations were made.

The discussion on the paper was postponed until the next session.

At the afternoon session 18 persons were present. The president called for discussioa of Prof. Forbes's paper. Messrs. Howard, Riley, Fletcher and Forbes discussed the points brought forward and the difficulties of getting at accurate and final results were brought out. The question of possible relationship between the apple plant louse and the corn plant louse was discussed by Messrs. Riley and Forbes.

Mr. Howard asked whether Prof. Forbes considered his experiments with the apple plant louse were satisfactory.

Prof. Forbes thought not entirely but they were the best they could do under the circumstances.

Mr. Fletcher asked whether the habits of different broods in species which migrated from one plant to another were not very different and therefore difficult to experiment with—as, for instance would the hop inhabiting form of *Phorodon humuli* live upon plum if placed there artificially and *vice versa.*

Prof. Riley thought it would not. It is very difficult to do artificially what nature does in her own time and in her own way. Sometimes an insect will not colonize upon a plant at a certain season, to which at another time of the year it migrates naturally. He asked if the experiments made upon the root forms were done carefully as there are many species which resemble each other which have root forms.

Prof. Forbes stated that great care had been taken in carrying out the experiments.

Prof. Forbes read a paper " On the life-history of White-grubs, with descriptions of new stages." Current mistakes with regard to the life-histories of these injurious insects were pointed out. Several species of Lachnosterna were observed to reach the imago state in the autumn instead of in spring as usually stated and the differences between groups of larvæ were pointed out.

The paper was discussed by Messrs. Smith, Howard, Forbes and Riley, who confirmed many of the points made in the paper.

Mr. C. A. Hart read a carefully prepared paper on " The life-history of Wire-worms," in which he drew particular attention to distinguishing characters by which these larvæ might be divided into groups.

The paper was discussed by Messrs. Cook, Gillette and Bruner.

Prof. Cook had found that one crop of buckwheat will not prevent injury the next year.

Mr. Fletcher gave some " Notes upon Injurious Insects of the year in Canada." Cut-worms of various kinds had been locally abundant. *Agrotis turris* had been destructive in gardens to flowers and vegetables. *Hadena arctica* and *H devastatrix* had injured fall wheat and grasses in the spring. He was more than ever in favour of the poisoned trap remedy for cut-worms. *Agrotis fennica* had injured clover. The caterpillar of *Pieris rapæ* had been very troublesome, but was easily destroyed with pyrethrum powder diluted with four times its quantity of common flour or slaked lime.

Plutella cruciferarum had also done much harm to cabbages in the North-west Territories and British Columbia. This is much more difficult to destroy with pyrethrum than the last named. The Cabbage Root-maggot had attacked cabbages severely, but had been successfully destroyed by syringing about half a cupful of hellebore tea round each root and then hoeing the soil well up round the stem. He had made some interesting studies of the Hessian fly which agreed in the main with those published by Prof. Forbes in a late bulletin. Spring wheat sown in the end of April had been attacked at the root in the same way as wheat is injured by the autumn brood. From the same wheat plants he had bred the Hessian fly, the Wheat Bulb-worm and *Oscinis variabilis.* Insects injurious to fruit trees had been represented by the Plum Curculio, the Codling Moth, the leaf roller of the apple and the Canker worm. All of these had been successfully treated with Paris green. Observations on forest insects had shown him that the large cerambycid larvæ from eggs laid early in the season produced the perfect insects the next year; but those laid late passed two years before coming to maturity. He had taken a female of *Monohammus confusor* with the abdomen filled with eggs as late as the middle of September. The attacks of *Nematus erichsonii* on larches in the Provinces of Quebec and New Brunswick were described.

Prof. Webster asked whether *Agrotis fennica* had been observed feeding on cereals.

Mr. Fletcher had found that it fed primarily on clover, but when occurring in numbers is almost omnivorous. Asparagus beds, raspberries and strawberries were injured and some young forest trees grown in nursery rows and of various species had had the terminal buds destroyed.

Prof. Cook had found the larvæ to eat everything. It had attacked blue grass and timothy severely. He was not positive about its attacking grain but believed it would.

Prof. Smith, speaking of the best way to use pyrethrum powder, said that he had found it most satisfactory in water.

Mr. Beckwith had found it could be used most satisfactorily with lime.

Mr. Fletcher asked whether the dry powder was not as a rule better than the water mixture. He had found it so in his experience.

Prof. Cook and Prof. Gillette had found it so also.

Prof. Summers found that the difficulty with water mixtures was to make them adhere to the plant: he asked whether the addition of soap would make them stick better.

Mr. Fletcher said it would on such plants as threw off liquids by reason of a waxy secretion on the leaves, as the cabbage, etc., etc.

Prof. Cook asked whether Mr. Fletcher still made up his cut-worm traps in bundles. He had found it most satisfactory to put a supply of poisoned vegetation on a platform waggon and then pitch it off with a fork.

Mr. Fletcher answered that he did and not only that but he found that it paid for the extra trouble to cover the bundles with shingles which kept them from drying up so soon. He warned those who advised this remedy to mention that the cut-worms do not lie under them in sight, but burrow beneath the soil and are not seen unless looked for. They sometimes wander off to a distance of two or three feet.

Prof. Cook confirmed this. He used clover largely. He sometimes sprayed a patch with poison as it stood and then mowed it and used it as traps.

Mr. Fletcher had found that clover was not the most satisfactory plant for him at Ottawa. It is frequently not far enough advanced in the early spring when needed and did not hold the poison well. He always recommended any succulent plant and was careful to tell farmers that they could use almost any weed growing about their fence corners, He had found *Lepidium Virginicum*, pepper grass, a very attractive plant. *Chenopodium album*, lamb's quarters, is also greedily eaten by cut-worms; but it is difficult to make the poison adhere to it. For such plants it is necessary either to dust them with dry powder after damping them or to rub up some soap in the water.

Prof. Cook had found mullein to be a most attractive plant for cut-worms.

The meeting adjourned to meet again next year at Washington.

KITCHEN-GARDEN PESTS AND HOW TO DEAL WITH THEM.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

In writing on insect pests I have not hoped to tell of any new discoveries. My object has been to present in a concise form, for the use of husbandmen and housewives, such particulars as I have thought might be interesting and useful to them. I have wished to do my part towards the making of the annual reports of the Entomological Society of Ontario handy repertories of practical information.

I shall in this paper tell of kitchen-garden pests, grouping them as flies, lice, beetles, butterflies and moths.

FLIES (*Order*, Diptera).

THE RADISH FLY (*Anthomyia raphani.* Harris).—This fly appears in the end of June and the beginning of July. It is rather less than half an inch in expanse of wings. Its colour is ash grey. The wings are transparent with a yellowish tinge at the base. The halteres or balancers are yellow. The face is silvery. The eyes are copper-coloured. The insect lays its eggs on the stems of the radish near the ground. The newly-hatched maggots penetrate the swelling roots, enlarging their mines as they grow and filling them with *frass*, rendering the radishes quite unfit for food. When full grown the maggots leave the root and change to pupæ in the soil. The full grown maggot is about a quarter of an inch long, truncated at the end and gradually tapering to a point at the head. This is furnished with a pair of black nippers. At the truncated end of the creature may be seen the outer prolongations of the two main tracheæ, and round the edge of it a number of teeth or tentaculæ. The general colour of the maggot is shining white.

I have found that radishes sown on rich soil as soon as the frost is out of the ground—at Quebec, as soon as the snow disappears, that is to say in the beginning of May—will generally attain a growth of an inch and a quarter in diameter before they begin to show the operations of the maggot. I have this year made three sowings. The first, in May, was a success. Of the second, made early in June, about half of the radishes were fit for the table. Of the third, made in the end of the month, hardly any were eatable. They grew to a large size, but were bored through and through by the maggots. These were operating as late as October. On the 21st of November I had a number of roots dug up from under the snow. They contained no maggots, but showed recent traces of them and holes at the lower side where the creatures had made their exit into the soil.

The remedies that have been suggested against the radish fly have been such as by their foul smell are likely to drive the fly away, carbolic acid, gas-lime, etc. I have not much faith in such protectives. It seems to me that those who would raise late radishes must do so in frames covered, not with glass, but with fine netting fastened to slats.

THE ONION FLY (*Phorbia ceparum*, Meigen).—This fly (Fig. 11) also appears in June. It is ash-coloured and is set sparsely with black hairs. It has an interrupted dorsal stripe on the abdomen. The wings are clear. It measures half an inch in expanse of wings, and a quarter of an inch in length of body. The mother fly lays her white oval eggs on the edge of the sheath of the onion, near the ground, seldom depositing more than six on one plant. The eggs hatch in a few days, and the maggots, which in general appearance resemble those of the radish fly, work their way downward, inside the sheath, to the bulb. Having devoured one bulb they will pass on to another. They may often be found clustered on the outside of the bulb. It takes them a fortnight to attain their growth, and in another fortnight the perfect flies appear. While the onions are yet very young soot and wood-ashes should be scattered over the bed as a preventive, and where the maggots are really working hot water should be applied to the bulbs with a watering can. This will destroy the maggots without injuring the plants.

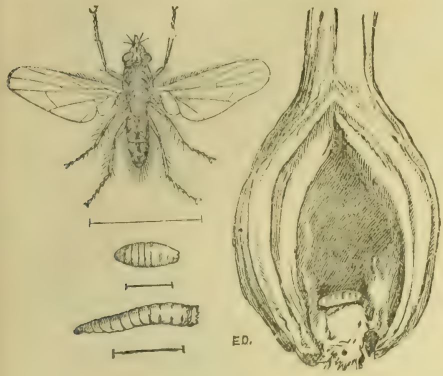

FIG. 11.

For a more full account of this pest see Dr. Bethune's excellent article on "*Remedies for Noxious Insects*," in the Society's 19th annual report.

THE CABBAGE FLY (*Anthomyia brassicæ*, Bouché).—The cabbage fly is ash-grey. The male has three black longitudinal lines on the thorax, a black dorsal line on the abdomen, and black bands at the edges of the segments. In the female the lines on the thorax and the bands on the abdomen are wanting.

The female fly lays her eggs at the junction of the lowest leaves with the stem. The larvæ eat the rootlets and penetrate the main root and the stock. The plant speedily withers away. In wet seasons especially the insects are often very destructive.

It has been recommended as a preventive that, at the time of planting, the roots and stems of the cabbage plants should be dipped in weak lye of ashes. As a remedy Dr. Lintner tells us (1st Annual Report of Injurious and other Insects of the State of New York. p. 190), "Watering the plants with lime-water has been found to be of service in killing the larvæ."

THE ROOT FLY (*Anthomyia radicum*, Linn).—The male of the root fly has the thorax on the upper side, marked with three black longitudinal stripes and three grey ones. The abdomen has a black dorsal line and is crossed with black lines at the sutures. The female is lighter in colour and much resembles *A. brassicæ*, but it has three fuscous longitudinal lines on the thorax. She lays her eggs in the crown of the turnip or other root. These hatching, the ochre-coloured maggots work down into the bulb. When full grown they leave the bulb and pupate in the earth. The flies appear in the spring.

The use of superphosphate as a manure will preserve the turnips from the attacks of the fly.

THE BEET-LEAF MINER (*Chortophila betarum*, Lintner).—This is a small fly, expanding four-tenths of an inch only. The body colour is grey. The thorax has three dusky stripes. The wings have a brownish tinge ; and the legs are black. It appears in June, and lays its beautifully reticulated eggs on the under surface of the leaves. The larvæ work in the leaf, between the upper skin and the lower, consuming the parenchyma. They are, when full grown, a quarter of an inch long, translucent in appearance, pointed at the head, which is furnished with black nippers, and truncated at the other extremity. To pupate they leave the plant and enter the soil. The pupa-case (puparium) is chestnut brown. From it the fly escapes in about twenty days. (See Dr. Lintner's 1st Annual Report on the Insects of New York State.)

The method of dealing with this insect is plainly to break off the affected leaves and to crush them under foot, or throw them into boiling water.

LICE (*Order*, Hemiptera).

THE BEAN LOUSE (*Aphis fabæ ?*).—A few years ago I found on some Mazagan beans that I was growing in my garden at Cowansville, a cluster of plant lice. They were lead-coloured and rather large. I had read of the marvellous increase of the Aphis, and I resolved to let these specimens on my beans live out their life and have their own way. The consequence was, that in a few weeks the whole row of beans—and it was a long one—was blackened with Aphides. This was quite in accordance with Reaumur's statement that one aphis can produce about 90 young ones, and that in five generations the increase from the one will amount to 594,900,000. As the season went on great numbers of the larvæ of one or two species of Lady-birds (Coccinellidæ) appeared on the scene and worked great havoc amongst the hosts of the enemy.

In dealing with a pest such as this, watchfulness and promptitude are required. The first clusters of the aphis should be picked off and destroyed.

THE CABBAGE LOUSE (*Aphis brassicæ*, Linnaeus).—This insect is often very abundant. It is found on the under side of cabbage leaves, and has a whitish, mealy appearance.

Dusting lightly with flour of brimstone has been recommended as a remedy for it.

BEETLES (*Order*, Coleoptera).

THE COLORADO POTATO-BEETLE (*Doryphora decem-lineata*, Say).—This, the well-known Potato-Beetle (Fig. 12) needs no description. Under its normal conditions, on the slopes of the Rocky Mountains, it fed upon the wild potato, *Solanum rostratum*. Access to the cultivated plant gave it that increase of vitality and fecundity which has rendered it so formidable a foe to the gardener.

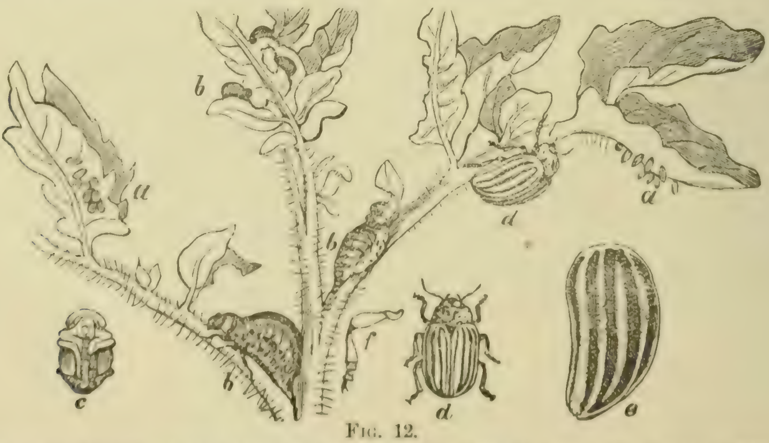

FIG. 12.

Of the Solanaceæ, or Nightshade family, to which the potato belongs, there are in North America six genera, not counting the South American genus, Petunia, now so largely cultivated in flower gardens. They are (1) *Solanum*, Nightshade; (2) *Physalis*, Ground Cherry; (3) *Nicandra*, Apple of Peru; (4) *Hyoscyamus*, Henbane; (5) *Datura*, Thorn-apple; (6) *Nicotiana*, Tobacco. The first of these includes the potato, the egg plant, and the tomato, all of which are eaten with avidity by the beetle. When stinted of its favourite supplies, the insect turns to such other members of the family as may grow within its reach. The tobacco plant is attacked by it, and I have found it also upon Physalis and Datura.

It would seem that the forced vitality of the species is now diminishing. There is a narrowing down apparently, 1st, as to the number of broods, 2ndly as to the number of individuals. Professor Claypole, of Akron, Ohio, brought the diminution in the former case, under the notice of the American Association for the Advancement of Science, at the Minneapolis meeting. He said:—"This insect (the potato beetle) came as usual in middle Pennsylvania in the early summer. I was compelled to use poison as in previous years. In the latter portion of the summer I observed, and noted at the time in the *Canadian Entomologist*, that there was no second brood, or that it was so small as to pass unnoticed. It was my intention to watch in 1883 in order to determine if this second brood was again missing; but to my surprise, in 1883 there was almost no first brood."

In the neighbourhood of Quebec, late plowlng, by disturbing their hibernacula, has destroyed great numbers of the beetles, and the lingering winter has retarded the appearance of the survivors, so that the first brood of the year has been both late and comparatively weak in numbers. For the last two seasons I have not had occasion to use Paris green on the early potatoes grown in my garden, but later-planted field crops have called for an application of the drug. The decrease in the number of perfect beetles appearing in the fall has been very marked.

THE THREE-LINED POTATO-BEETLE (*Lema trilineata*, Olivier).—This is a buff-coloured beetle, (Fig. 13) having three black stripes on the wing covers. Its length is a quarter of an inch. It appears in June, and attacks the potato plants. It lays its yellow eggs in small clusters, and in a fortnight the larvæ appear (Fig 14). They are of a dirty yellowish grey, and are generally seen with a thick coating of excrementa on their backs. This filthy covering is believed to serve for a defence against their insect enemies, and as a protection also from the heat of the sun. In about another fortnight the insects bury themselves in the ground and form cysts in which to undergo their pupal change. In a fortnight more the perfect beetles appear and lay their eggs for a second brood.

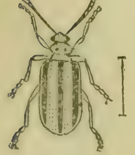

FIG 13.

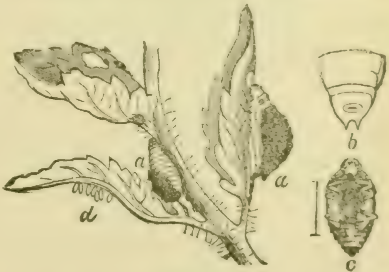

FIG. 14.

Paris green applied in the usual way is the remedy for these pests.

THE CUCUMBER BEETLE (*Diabrotica vittata*, Fab.).—The cucumber beetle is about two lines in length. It is yellow, and has a black head, and three black lines running along the wing-covers. The larvæ feed on the roots, and the perfect insects on the tender leaves of the cucumber, melon and squash.

To destroy the larvæ water the plants with soapsuds, and to check the operations of the beetle sprinkle the leaves with hardwood ashes.

The Striped Flea-Beetle (*Haltica striolata*, Illiger).—This minute beetle (Fig. 15) is black, with a buff stripe on each wing cover. It is beautifully formed, highly polished and very lively. It hibernates in the imago state, and comes forth early in spring to lay its eggs, and to enjoy itself at the gardener's expense. Its favourite food plant is the turnip.

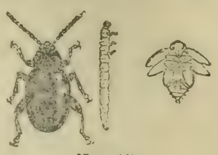
Fig 15.

Lime water has been used successfully against its English congener. To disappoint the "flea" *sow late.*

The Ash-Coloured Blister-Beetle (*Macrobasis unicolor*, Kirby).—In the Eastern Townships the Windsor beans and potato vines are often infested with an ash-grey beetle of about three-fifths of an inch in length. The ash colour is owing to a soft down which rubs off leaving the surface black. This beetle is one of the Cantharides, and is as efficacious for medical purposes as the "Spanish Fly." It may be easily shaken into a pan of scalding water, and afterwards dried for medical use.

Butterflies and Moths (*Order*, Lepidoptera).

The Cabbage Butterfly (*Pieris rapæ*, Linnaeus).—That destructive pest the cabbage butterfly (Fig. 16 the male, fig. 17 the female) was first taken in Canada by Mr. Wm. Couper of Quebec. This was in 1860. The insect had probably been cast upon the shores of the St. Lawrence in the larval or pupal stage, with refuse cabbages from the steamships. We are indebted to Mr. Scudder for a full and most interesting account of the after progress of the species on this continent. From this account it appears that in 1866 it had spread to Cacouna, where it was taken by Mr. Saunders, to the Eastern Townships, where I captured it myself, and into the State of Maine. In 1867 it reached Montreal. In 1868 a fresh importation by way of New York was made. The story runs that a German naturalist in that city obtained chrysalides from Europe, and that the imagos issued from these during his absence, and escaped through an open window. The insects spread in ever widening curves, both from New York and Quebec, till, in 1871, the two hordes met. In 1876 they had spread over the whole of Western Ontario. In 1881 they covered the country from the seaboard to Texas, Kansas, Nebraska, and Lake Superior; and by 1884 they had been met with on the shores of Hudson's Bay and at the foot of the Rocky Mountains.

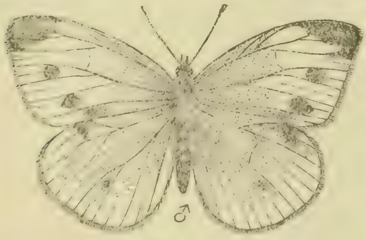

Fig. 16.

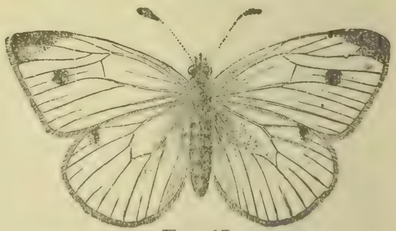
Fig. 17.

Pieris rapæ may be readily distinguished from the less common native white (*Pieris oleracea*, Harris) by the black spots upon its wings. The female may be constantly seen in the summer months hovering over the cabbages, curving its abdomen and attaching its eggs dispersedly upon the plants. The larvæ are green irrorated with black. They have the habit of lying along the ribs of the leaves where they are not readily seen.

Dr. Lintner recommends sprinkling with water heated to 130 Fahr. and upwards (1st An. Rep. p. 59).

THE CABBAGE PLUSIA (*Plusia brassicæ*, Riley).—This insect has at length invaded the Province of Quebec. It has been taken at Metis by Mr. Winn. Its numbers will probably increase. The fore wings of the moth are brownish grey, and have yellowish, indistinct, transverse lines. In the centre of each fore wing is a silvery, horse-shoe-like mark, with a silvery spot beyond it at the lower side. The hind wings are yellowish, with smoky hind margins. The male moth is furnished with conspicuous abdominal side tufts of a golden hue.

The larva is a half-looper, having only twelve legs. Its head is small and flat, and the body is gradually enlarged from it to the anal segment, which appears as if abruptly sliced off. In colour the caterpillar is translucent pale green, marked with delicate longitudinal white lines, and with white spots. In each of the latter is set a short dark hair.

The pupa is of a pale colour, yellowish or green, and is enclosed in a slight cocoon.

Besides the cabbage, the turnip, lettuce, celery and tomato afford food for this pest.

An application of hot water as recommended in the previous case, is probably the best remedy for the assaults of the insect.

THE CUT-WORM MOTHS.—These are a numerous family, including species belonging to the genera, *Agrotis*, *Mamestra*, *Hadena*, etc. They may be grouped as *climbing* and *surface* cut-worms. It is with the latter I am for my present purpose, more particularly concerned. I shall give a short account of a few representative species of these, and for further particulars would refer the reader to a valuable paper written by the late Mr. G. J. Bowles, which may be found in the Society's Annual Report for 1879.

THE DEVASTATING DART-MOTH (*Hadena devastatrix*, Brace)—This moth is one and three-fourths inches in expanse of wings. The fore wings are dark brownish gray, and have several whitish transverse lines. Near the hind margin is a row of arrow-headed black spots pointing towards the base of the wing. The hind wings are light brownish grey. The thorax is dark grey like the fore wings and the abdomen is of the same colour as the hind wings.

The caterpillar, (Fig. 18) known as the "Glassy Cut-Worm," has a translucent glassy-green body, a Venetian-red head, and a dark-brown cervical shield. It has a few scattered spots on each segment—each spot being furnished with a single hair. The caterpillar hibernates in the soil, and, coming out early in the spring, commences its destructive work upon the newly-planted cabbages. It feeds only at night, and lies hid in the soil, near the root of the plant, during the day.

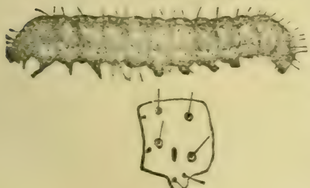

FIG. 18.

THE BARRED-ARCHES MOTH (*Hadena amica*, Harris).—This beautiful moth expands about two inches. The ground colour of its fore wings is rich Spanish brown. Near the hind margin is a broad, wavy, bluish-grey band, and near the base of the wing is a narrower and darker wavy band. The reniform stigma (kidney-shaped spot in the middle of the wing) is large and distinct. The hind wings are ash-coloured, clouded on the outer margin.

The caterpillar which is called the "Yellow-headed Cut-worm," is of a smoky-brown colour, and the head, cervical shield, and anal plate are yellow, or chestnut-coloured. This creature cuts off the young corn *below* the surface of the ground.

THE LANCE RUSTIC MOTH (*Agrotis telifera*, Harris). (*Ypsilon*, Rott).—Harris was the first to describe this fine insect, which measures an inch and a half in expanse of wings. (Fig. 19.) The fore wings are brown, dark along the costa and through the middle. Near the hind margin is a light-brown band, and at the base of the wing is a light-brown patch, shaped like the head of a fish with the mouth open. Pointing outwardly from the reniform stigma is a black lance-shaped mark. The hind wings of the moth are pearly white shaded with brown.

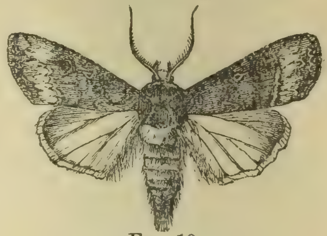

FIG. 19.

The caterpillar known as the "Greasy Cut-worm," is dull leaden brown, spotted with shiny black. Its dorsal and side lines are yellowish. The creature is highly destructive to corn, tobacco, tomatoes, etc., cutting the plants an inch *above* the ground.

THE CLANDESTINE OWLET MOTH (*Agrotis clandestina*, Harris).—In expanse of wings this moth measures an inch and three-quarters. It is a very sober-coloured moth. The fore wings are dark ashen. In them the orbicular and reniform stigmata are connected by a black line. The hind wings are dirty brownish-white, darker towards the hind margin. The fore part of the body is chestnut brown. The moth received its name from its retiring habits and attempts at concealment.

The caterpillar (Fig. 20) is called the "W-marked Cut-worm." It is yellowish grey in colour, lined with yellow, and finely sprinkled with dark spots. On each side of the back, upon the abdominal segments, is a row of black velvety marks. These marks, when viewed from the front, are suggestive of the letter W—hence the common name of the creature.

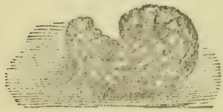

FIG. 20.

Nothing in the way of vegetables seems to come amiss to this cut-worm; beans, young corn, cabbage, pumpkins, etc., all are eagerly eaten by it. It has the habit of dragging its food under stones or into the ground, that it may feed upon it at leisure.

The methods to be pursued for protecting garden crops from the cut-worms appear to me to be these:—Because the caterpillars pass from plant to plant over the surface of the earth, and will not ascend a friable mound *corn should be "planted in the hill."* Around each newly-planted cabbage a ring of salt should be placed, a few inches from the stem. The larvæ will not pass over this, and the salt will act as a fertilizer. Whenever a plant is found to be nipped off, the cause of the damage should be dug for at the root with a knife or pointed stick, and when found, destroyed. Growing corn, cabbages, cauliflowers, tomatoes, etc., should be earthed up several times during their period of growth.

"The Husbandman's Own Insectide." Take plants of "poison poke," (*Veratrum viride*, Aiton) roots, stems and leaves, cut them into manageable lengths, make a decoction—a sap-kettle will be useful for the purpose—let the liquor cool, and then apply with a sprinkler or water-can. This will be found useful where the application of Paris green would be dangerous.

The gardener has a multitude of insect foes to contend with, but prompt and intelligent applications of preventives and remedies are very sure to be rewarded with success against them.

AN OUTBREAK OF THE ARMY WORM IN MARYLAND.

BY J. ALSTON MOFFAT.

It is seldom that we get an account of a remarkable occurrence in any department of life from a reliable eye-witness so competent to convey to others the facts seen by himself as is to be found in the following extracts taken from the report given by Mr. W. H. Ashmead to the United States Government, through the Entomological Department at Washington.

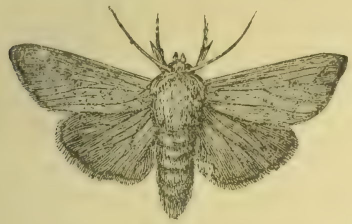

FIG. 21.

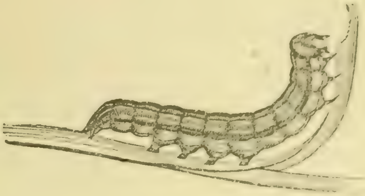

FIG. 22.

Although *Leucania unipuncta* (Fig. 21, the moth; Fig. 22, the caterpillar,) is a permanent resident in Ontario, and is frequently found quite abundant, it has never been reported as attracting special attention from its destructive effects on farm products here; and yet there does not appear to be any reason why it may not at some time do so.

The army worm has caused great loss in the Maritime Provinces, whilst in New York State and Massachusetts, where the climatic conditions must very closely resemble our own, it has been at times particularly destructive, whole fields being utterly ruined by it. Mr. Scudder made a calculation from what he saw, that there must have been at least two million worms to the acre, destroying an entire field in ten or twelve days. Therefore Mr. Ashmead's vivid description of the tremendous power of a combined attack of these despised creatures, should arouse those interested to the terrible possibility that may be awaiting them, and to guard themselves as much as possible against it, for it is a well known fact that slovenly farming is a great source of encouragement to all kinds of pests.

The army worm had a public reputation long before the moth, which gave rise to the destructive hordes, was certainly known to be the parent of all the mischief. It was about the year 1861 that the late Prof. Fitch unmistakably traced the connection between the two, and since then, by the careful industry of others, its life history has been well worked out, but previously many unfortunate moths had to bear the blame for that of which they were not guilty; and even yet the justly dreaded army worm is at times reported to have made its appearance and causes great consternation in a locality, where, if the nature and habits of different insects were better known, it would be readily seen that the army worm, at any rate, was not to blame, and that the fright had been caused, not so much from the attack, as from a want of a knowledge of how to distinguish between things that differ. If this had been possessed there might have been ample evidence to show that there was no cause for alarm, as it was not in the nature of that particular form to do any injury.

On one occasion I had an opportunity of witnessing an occurrence which forcibly illustrates this very condition of things. I had gone on a visit to the country about the end of wheat harvest, when a hot and dry spell was prevailing and all vegetation was, more or less, exhibiting the effects of it, by a rusty tinge to the green. Amongst the first things that I heard of was that the whole locality was overrun by the army worm, that they had eaten up every green thing and were now devouring the Canada thistles for want of something better, and whatever was to become of the crops next year they did not know. On the first opportunity I made personal observation—sure enough the thistles gave ample evidence that they had been greviously ill-used, many of them with every leaf gone and nothing but the bare stem left, and caterpillars everywhere. In one locality where the road allowance ran between two farms with snake fences on each side, there was, on the one hand, an old pasture field, very brown and desolate to look at, on the other was a summer fallow, which had in places a luxuriant growth of Canada thistles, and I saw the worms crossing the road, in single and double file, in colums and squares, platoons, companies and battalions of them, and a toilsome march they had of it, especially when crossing the road-bed, which was deep with hot dust, leaving the dried up pasture field and all making direct for the fallow, apparently with a full knowledge of the fact that there was food to be got when they reached it; and I observed that the thistles in the fallow were being visibly reduced day by day. But it turned out that this all devouring host which had been causing such consternation in that locality, was composed entirely of the larvæ of *Pyrameis cardui*, or the thistle butterfly; and no doubt but they had rigidly confined themselves all the time to their own natural and proper diet. In due time they disappeared and nothing was heard of them afterwards.

The following is Mr. Ashmead's account of the outbreak of the army worm above referred to:

In accordance with Professor Riley's instructions, on May 31, accompanied by Mr. Albert I. Hayward, of the Maryland Agricultural College, I started for Salisbury, Wicomico County, and Princess Anne, Somerset County, Md., to make such observations on the army worm (*Leucania unipuncta*), then depredating in the vicinity of these places, as the limited time at our disposal should permit.

During our journey we ascertained, in conversation, that the worms were most numerous in the immediate vicinity of Princess Anne, and we took the most direct route for that place.

As we approached our destination we began to see the effects of the worms' work; just before entering the town we passed by a large field of corn, owned by Mr. H. H. Deshields, containing about twelve acres, that had been devastated by them, and only a few green plants could be detected here and there in the field.

This field was in marked contrast with another corn-field adjacent, which had been saved from attacks by ditching, as recommended in the third report of the U. S. Entomological Commission. Another thing observed was that this field was flanked behind with a wood that evidently prevented their ingress that way, whereas the former was contiguous to grass and wheat fields, in which the worms are said to originate.

Just before entering the town we passed another ten-acre corn-field, owned by Mr. John L. Lormer, that but a short time previously presented a most promising appearance, but which to-day is completely "cleaned out" by the worms. It may be worthy of record, as the theory has been advanced that insects originate in just such places, that in an adjoining field were three old hay-stacks. Contrary to our expectations we found the reports of their numbers not at all exaggerated, and the damage done is even worse than we anticipated—the wheat, corn, barley and timothy of many of the farmers being totally ruined by them.

One of the most interesting places for observation we visited was that of Wm. J. Porter, a practical and energetic farmer, who, although he has fought the worms most vigorously, has suffered severely from their attacks. By means of ditching and by burning straw, he has been able to save part of his crops, but several of his fields of corn, timothy and wheat, were already ruined. He reported the worms much less numerous than they had been, but we saw many thousands in his fields.

During our rambles Mr. Porter took us to one of the ditches he had dug to keep the worms out of a large corn-field. In this ditch he had sunk every two or three yards apart, deeper pits, where we found the worms two and three inches deep, and the rest of the ditch was black with the dead and living worms. From the dead a fearful stench arose in such strength as to attract the buzzards, which, as we viewed the scene, were proudly sailing overhead.

Mr. Porter informed us that the worms always originated in the wheat and old grass-fields, and during the morning hid themselves from observation, never appearing in numbers until after 3 o'clock p.m., which accorded with our own observations and with those of the other farmers visited.

They ate up the timothy and corn clean, and after devouring the blades of the wheat congregated, three or four together, on the heads; after devouring several of the lower grains they ate the husks and nipped off the upper portion of the kernel of the rest, thus almost entirely destroying it. If the grain is well advanced and somewhat hard it escapes destruction; but as most of the wheat visited was still in the milk the destruction was great, and not less than 75 per cent. of the crop had been already destroyed.

Although several parasites are known to prey upon the worms, and we kept a sharp lookout for such, none were seen except a few cocoons of an Apanteles which were discovered, together with the worms, under old trash and logs in a wheat-field. A few were gathered and forwarded to the Department, some of which have since hatched, and proved to be *Apanteles militaris*, Walsh.

On a neighboring farm, owned by Mr. Z. Rouch, almost as much damage had been done by the army worm as on the former place. A large corn-field and a field of timothy were totally ruined. A wheat-field, farther advanced than that of Mr. Porter's, was less seriously affected, although it did not escape entirely, the blades of the wheat and the young timothy being entirely eaten up by them.

It was on this place that we saw the effects of the worms on barley. Quite a large field already in head was completely ruined.

In the afternoon we visited probably the largest farm in the county, that of the Hon. D. N. Dennis, comprising 500 acres or more.

No better place existed for the proper study of the pest, as the worms were swarming in all the fields by the millions, and we had hit upon the proper time of day to see them most advantageously, 4 o'clock p.m. The ground was literally black with the crawling worms. Mr. Dennis had made no special efforts to destroy them, although, like some of his neighbours, he had surrounded some of his fields with ditches in an attempt to keep them out of adjoining fields. I believe it would have been quite practicable to have destroyed many thousands with poisonous washes, or, as Mr. Potter did, by burning straw in the ditches, as the bottom of the ditches were black with worms.

This farm is divided by a central lane, on either side of which are fields of wheat, corn, grass, oats, etc., and in passing through this lane we found the worms quite plentiful, crawling almost invariably in the direction of the prevailing wind.

One of the first fields we passed was an immense wheat-field already in the head, and the worms could be plainly discernible on the ground all through it and on the stalks and heads. The worms having already devoured the young timothy and other tender plants usually found growing there, the blades of the wheat, the husks, and a goodly portion of the kernels, evidently could not find sufficient food and were now migrating to pastures new, the sides of the field being black with moving hosts seeking more nutritious food.

These, as well as all the others observed, were moving in a south-westerly direction, the direction of the prevailing wind. They were apparently in all stages of growth, from little fellows not more than a quarter of an inch long to the fully matured larvæ, and all got over the ground and every obstacle in their way with the most surprising rapidity. The fences, posts, and other obstacles in their way were no obstruction to their migratory instinct, or their search for food. The fence rails and posts were often covered with crawling worms, sometimes not less than a dozen worms being found on the top of a single tall post, while others were seen going up on one side as others were going down the opposite. Some specimens were even found under the loose bark on the posts and rails, where they had probably crept for shelter. One specimen thus found was in the jaws of a large hairy spider, *Salticus* sp.

Adjacent to this wheat-field was a large field of timothy, containing 17 acres, the blades of which had been cut off by the worms as clean as cattle could have done. Mr. Jones, the overseer, informed me this field would have harvested not less than three tons of hay to the acre, but now it would not pay for the cutting.

At one side of this field, the side next the wheat, the worms had congregated in countless numbers, every square foot having not less than 30 to 50 worms. The worms were now coming out of this field and going into the adjoining wheat-field and crossing the lane into the opposite fields in great numbers, and it was here that we observed a flock of the common English sparrows and a few robins picking out the smaller worms and feeding on them. Mr. Jones informed us the English sparrows had been thus busily engaged all the past week, and it gives us pleasure to record here this fact in favor of the despised bird.

Some distance off from this field was another one of wheat, containing probably 20 acres, in which the worms were even more numerous, and they had already sufficiently injured it to render the crop unprofitable to harvest. A deep, broad ditch had been dug along one side, and it was now, about 5 o'clock p.m., black with worms. It seemed to us a pity that these worms were not killed, as many of them were able to crawl up the sides and escape into adjoining fields.

Facing this field was a large corn-field of probably 75 acres, of which 50 acres had already been destroyed, and there was but a slight chance that any of the corn still left would escape, although by ditching an effort was being made to save it. Of the 50 acres destroyed 30 acres had already been replanted, and in the newly plowed portion the worms were seen moving about in all directions, having just entered it from the adjoining wheat; it is probable that most of these will die of starvation or from the effects of the hot sun in the middle of the day.

TORTOISE BEETLES.

BY F. B. CAULFIELD, MONTREAL.

The tortoise beetles as they are called, from their resemblance in shape to a turtle or tortoise, belong to the great family of leaf eating coleoptera, the *Chrysomelidæ*, but were formerly classed as a distinct family, the *Cassidadæ*, a term signifying a helmet, the fore part of the thorax generally projecting over the head like the front of a helmet. In the members of this family the body is generally of a broad, oval form, flattened beneath, convex above. The antennæ are short and thickened at the tip, presenting somewhat the appearance of a club. The head is small and generally hidden beneath the overlapping edge of the thorax, and the legs are very short, not extending much beyond the margin of the wing covers, so that the resemblance to a tortoise is really striking. The larvæ of many kinds of insects are protected from the burning sunshine and the attacks of their enemies by a coat of hair or prickly spines, or else conceal themselves beneath leaves or in crevices during the hotter parts of the day, but the insects in question adopt an entirely different plan, and shelter themselves beneath umbrellas, covered, not with silk or cotton, but with a mass of their own excrement.

In most of these creatures the body resembles the perfect insect in shape, being broad and flattened, but they differ in having a row of spines on each side and in being provided with a tail, and a very remarkable tail at that. This instrument resembles in form a fork, with a rather thick, rounded handle, from which project two long prongs. This forked tail is curved over the creature's back, and upon the prongs and lateral spines the excrement is heaped until a mass almost as large as the creature's body is accumulated. Our Canadian species of tortoise beetles belong to three genera—*Physonota*, *Coptocycla* and *Chelymorpha*. *Physonota helianthi*, Rand, lives on the wild sunflower (*Helianthus*), and soon after these have leafed out in spring, such of the beetles as have survived the winter gather upon them. They are now of a bright, golden-green colour, and are exceedingly beautiful, gleaming and flashing like gems in the sunshine. Soon after this the eggs are deposited in an irregular cluster, covered with a gummy exudation which hardens on exposure to the air. This cluster is placed on the upper surface of the leaf, and near the tip just where it tapers to a point.

The larvæ are oblong-oval in shape, and when full grown measure nearly an inch in length. The general colour is dark olive green, and on the back are three short yellow stripes, that in the centre being a little the longest. On each side is a row of ten simple spines. When undisturbed these slug-like larvæ keep the tail curved over the back, and both body and tail are constantly wet with semi-fluid excreta, so that the form of the creature can hardly be seen. From the middle of July to the end of August these larvæ change to chrysalids, and by the end of the latter month and during September the beetles emerge, and may be found resting quietly on the leaves of their food plant. They are now dressed in a coat of sober black, irregularly spotted with creamy white, very pretty little fellows in a neat evening dress, but very different to the magnificent marriage garment worn by their parents amidst the fresh green leaves and glowing sunshine of the early summer.

The beetles appear to eat very little, but the larvæ are hungry creatures, eating numerous holes in the leaves, and when abundant almost stripping the plants.

When young the larvæ are of social habits, and huddle closely together, the heads all in the centre, surrounded by a ring of curled up tails, presenting a most curious appearance. When nearly full grown they separate and scatter over the plants, each one shifting for himself. The perfect insect measures about five-eighths of an inch in length.

The species belonging to the genus *Coptocycla* are smaller than *Physonota*, and differ somewhat in some of their habits. The eggs are deposited singly on the leaves, and when the larvæ moult, the cast skins are slipped into the forked part of the tail, whereas the larvæ of *Pysonota* leave their discarded garments sticking to the leaves.

The golden tortoise beetle, *Coptocycla aurichalcea*, Fab. is very common on the Morning Glory, and often disfigures and injures it by eating holes in the leaves. They also attack the sweet potato. Prof. Riley states that they are often sufficiently numerous to destroy whole fields of this esculent, and they are especially severe on the plants when freshly transplanted from the hotbed. When freshly emerged from chrysalis the beetles are of a dull orange color, but in a few days this tint changes to bright gold color, when they present a most beautiful appearance as they glisten in the sunshine. The larva resembles the beetle in general shape, being broad and flattened, but on each side there is a row of sixteen barbed spines; it is of a dark brown colour, with a pale shade upon the back. Prof. Riley says that it carries its falcifork directly over its back, and the excrement is arranged in a more or less regular trilobed pattern.

The mottled tortoise beetle, *Coptocycla guttata*, Oliv., is also common on, and injurious to, the morning glory and sweet potato. It varies considerably in colour, some specimens being very dark—almost black, others are mottled with black and gold, and occasionally examples are found altogether of the latter colour. The larva is green, bluish on the back. Prof. Riley states that it carries its dung in irregular broad masses, often branching out into long shreds and ramifications.

Another species, the clubbed tortoise beetle, *Coptocycla clavata*, Oliv. is found on the true potato. It is given in the Society's list of Canadian beetles, but so far as known to me, has not been found in the Province of Quebec.

The "shell" of this species is thin and semitransparent, with patches of darker color, some of which extend to the margin of the wing-covers. I have seen no description of the larva.

Chelymorpha argus, Licht., is of a dull, yellowish-red colour, ornamented with nineteen small black spots, six on the thorax and thirteen on the wing-covers. It measures about three-quarters of an inch in length. Packard states that "the larva differs from that of *Coptocycla aurichalcea*, not only in its greater size, but the body is thicker and narrower, the head is freer from the thorax, and the spines are simple, not spinulated. The body is yellow and less protected by the cast skin. When about to transform the larva attaches itself to the leaf by a silken thread, a few segments from the end where the end of the body of the future pupa is situated. It is .45 of an inch long. The pupa is broad and flattened, dark and spotted with yellow, and covered with a whitish powder, causing the yellow portions to appear more prominently; along each side of the abdomen is a row of five spines, and there are four spines on the anterior edge of the prothorax; it is .40 of an inch in length." He further states that he has found it in all its stages on the silk-weed late in July and early in August, and in one instance in Salem it occurred in abundance on the leaves of the raspberry.

I have myself found it in all stages on the morning glory at Montreal some years ago, but have not met with it recently.

Tortoise beetles may be destroyed with Paris green, but as they often hide beneath the leaves, they are not so easily killed as the Colorado potato beetle. The plants should be closely watched when set out in spring, as at this time the beetles are comparatively few in number, and could be killed before the eggs are deposited, which would save much future trouble and expense. "An ounce of prevention is worth a pound of cure."

Tortoise beetles appear to be remarkably free from parasites. I have bred numbers of *Physonota helianthi*, but only raised one parasite, a small dipterous fly.

QUEBEC REPRESENTATIVES OF THE GENUS PLUSIA.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

Following are the characteristics of the genus Plusia :—

Imago, antennæ setaceous, thorax and abdomen crested, fore-wings acute, curved on the hind margin, glossy, and often ornamented with metallic markings.

Larva, loops somewhat in walking, having twelve legs only ; attenuated anteriorly ; feeds exposed on low plants.

Pupa, inclosed in a slight cocoon.

Insects belonging to the genus Plusia may be readily distinguished by the conspicuous crest which they bear on the shoulders, the tufted abdomen, and the bill-hook shaped curve of the inner margin of the fore-wings. These are more or less striking in them all. Some of the species are very abundant, individuals of them may be seen in our gardens, even in the hot sunshine, hovering over the blossoms or passing from plant to plant with easy rapid motions.

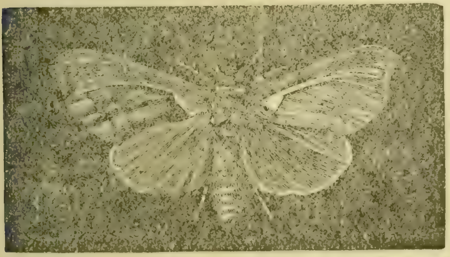

FIG. 23.

The largest, and I think the most beautiful of our Quebec species is *P. balluca* (Gey.) Fig. 23, which is one and three-fourths inches in expanse of wings. The splendid bronze-green of its wings, shining with the richest gloss of satin, will make it known to the veriest tyro in Entomology.

P. Putnami (Grote) may also be readily distinguished by its burnt-sienna coloured fore-wings with their golden apical streak, and their two central golden spots, sometimes united.

P. thyatiroides (Guen.) is very rare in the Province of Quebec. To those who are fortunate enough to meet with it, it may at once be known by the patches at the base and inner angles of its fore-wings, which are of a delicate pink, resembling in colour those on the wings of the English "peach blossom moth" (*Thyatira batis*). It is to these that the insect owes its name. The only specimen I have was taken at Cowansville in the Eastern Townships.

P. mortuorum (Guen.) also may be readily known. Its fore-wings are dark brown approaching to black. They are embellished with silvery lines and washes near the hind margin. Extending from the base to the centre of the wing are conspicuous plume-like silvery-white markings. This is one of the smallest species in the genus, expanding about one inch and a quarter.

The fore-wings of *P. ampla* (Walk.) are ash-brown with a rosy tinge. Extending from the inner margin to the middle of the wing is a well-defined dark-brown velvety patch, the inner side of which has a deep curve and is finely outlined with gold colour.

In *P. viridisignata* (Grote) the fore-wings are dark rosy-grey with numerous brown zig-zag lines. In the centre of the wing is an obscure bronzy-green figure, resembling a 3 or an 8 laid on its back.

One of the finest insects in the genus is *P. bimaculata* (Steph.). In expanse of wings it measures an inch and three-eighths. Its fore-wings are rich rosy-brown variegated with dark markings and with a patch of chestnut red in the centre. In this patch are two golden spots, the upper somewhat resembling the letter *v*. I have noticed that the Eastern Township's specimens of this moth are larger and brighter than the more northern specimens.

P. precationis (Guen.) is one of the most common species we have. Its fore-wings are of a rich purple brown with a golden sheen. They have a few pale wavy streaks, and a distinct silvery *y* in the middle of each.

In *P. simplex* (Guen.) Fig. 24 the fore-wing is of a dark ash-grey. It has a brown apical dash, and a brown shade on the inner margin. This shade is separated from the ash-grey base and basal portion of the costa, by a fine white line, which joins the inner arm of the silvery y-like central mark.

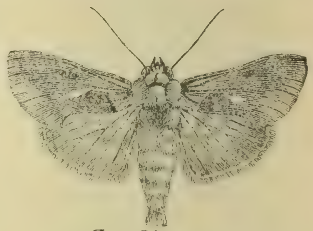
FIG. 24.

In *P. falcifera* (Kirby) the arms of the *y* are long and attenuated, and the tail lacks the terminal knob that is characteristic of Precationis and Simplex. Falcifera has rosy-brown fore-wings strikingly marked with curved and dentated rosy-white lines, having dark brown finer lines imposed. I captured several specimens of this insect at Como, P. Que. They were hovering over flowers on a sunny afternoon.

P. brassicæ (Riley, *Ni* Hubn) has been taken at Metis, P. Que., by Mr. Winn. This moth Fig. 25 expands about one and a half inches. It has dark greyish-brown fore-wings, with irregular, pale yellow cross lines, and in the centre a silvery *u* or horse-shoe like mark followed by an oval silvery dot. The underwings are yellowish clouded towards the outer edge.

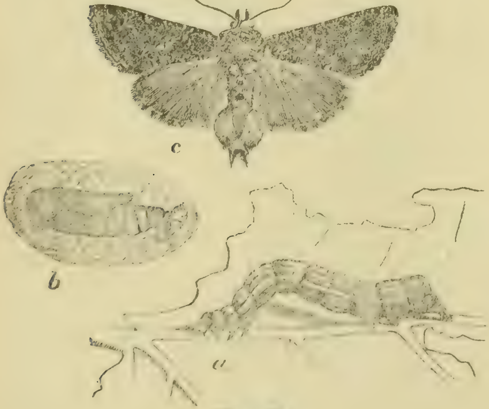

FIG. 25.

Of *P. mappa* (G. & R.) only a few specimens have been taken in the Province of Quebec. The insect may be known by the numerous dark brown wavy lines upon its tawny fore-wings. In the centre of each of these wings is a silvery *u*, or horse-shoe-like mark, followed by a dot or annulet.

P. U-aureum (Boisd.) is a small species expanding one and one-fourth inches. Its fore-wings are dark brown, and bear in the centre a golden or silvery mark resembling a squat capital *N*. On the fore-wings also are several irregular transverse golden or silvery lines.

Besides Balluca we have two species that have no metallic spots in the middle of the fore-wing, *P. ærea* (Hubner), and *P. æreoides* (Grote). In the former the wings are *dark* brassy-brown and in the latter, *pale* brassy-brown. Both have darker transverse markings. Æreoides has also, near the hind margin, a pale brassy transverse band.

TABLE OF QUEBEC SPECIES OF THE GENUS PLUSIA.

I.—Having white or metallic markings in the middle of the fore-wings.
- *A*. Having y-like markings in the middle of the fore-wings.
  - *a*. Having two golden marks as if the tail were cut off from the y.
    - PUTNAMI, which has a *golden* apical streak.
    - BIMACULATA, which has a *brown* apical streak.
  - *b*. Having the y complete.
    - 1. Tarsi of front legs banded brown and white.
      - FALCIFERA, which has no knob at the end of the y.
      - PRECATIONIS, which has the tail of the y knobbed.
    - 2. Tarsi of the front legs plain.
      - SIMPLEX.
- *B*. Having markings of other forms in the middle of the fore-wings.
  - *a*. Like *N*. U-AUREUM.
  - *b*. Undulating, like a small snake. AMPLA.
  - *c*. Like the figure 3 lying on its back. VIRIDISIGNATA.
  - *d*. Plume-like. MORTUORUM.
  - *e*. Like a small *v* followed by a dot or annulet.
    - 1. Having pink spots on the wings. THYATIROIDES.
    - 2. Having tawny wings. MAPPA.
    - 3. Having greyish-brown wings. BRASSICÆ.

II.—Having no metallic markings in the middle of the fore-wings.
- *A*. Having the wings glossy-green. BALLUCA.
- *B*. Having the wings glossy-brown.
  - *a*. Dark brown. ÆREA.
  - *b*. Light-brown. ÆREOIDES.

ORIGIN AND PERPETUATION OF ARCTIC FORMS.

BY J. ALSTON MOFFAT.

The subject of Arctic Forms is one of special interest in biology, and the frequent reference to it in natural history literature, keeps it constantly before the reader, and has made the theories concerning the origin and preservation of such forms well known, whilst to us as entomologists, it is of the very first importance in our efforts to obtain correct knowledge concerning the geographical distribution of insects. Grant Allen says :—

"On or near the summit of Mount Washington, a small community of butterflies belonging to an old glacial and Arctic species still lingers over a small area, where it has held its own for eighty thousand years that have elapsed since the termination of the great ice age. This same butterfly is found in two other localities on this continent; Long's Peak, Colorado, is eighteen hundred miles distant; Hopedale, Labrador, is probably a thousand miles away ; in the intervening districts there are no insects of the same species. Hence we must conclude, that a few butterflies left behind in the retreating main-guard of their race, on that one New Hampshire peak, have gone on for thousands and thousands of years, producing eggs, and growing from caterpillars into mature insects, without once affecting a cross with their congeners."

I learn from the writings of Mr. W. H. Edwards, that the name of that butterfly is *Chionobas Semidea* (Say.) The description given by Mr. Scudder of its terrible struggle for existence, tends to arouse one's interest in it, and draws out one's sympathy for it, as we contemplate the dreary and joyless life it is doomed to lead in its inclement home, so opposite to what is considered to be the typical life of a butterfly. Grant Allen's conclusion is in perfect harmony with the theories prevailing on this subject, but there is another view that can be taken of it, which appears to me to be more in harmony with nature and observation, although it may spoil the romance, and give less play to the imagination; and that is the one contained in the well-known principle of the power of environment to modify the external appearance of living forms, and their ability to accommodate themselves to altered conditions.

To illustrate the principle that I wish to apply in this case, I shall draw upon Mr. Edwards's article on "Pieris Bryoniæ and its derivative forms," to be found in *Papilio*, for June, 1881. He says:

"The species, of which Bryoniæ is one of the forms, is known as Napi, having in Europe three manifestations, Bryoniæ, Napi, and Napææ; the last of these was until recently regarded as a distinct species." Then quoting Dr. Weisman who says of Bryoniæ: "This is to a certain extent the potential winter form of Napi. This type Bryoniæ, in polar regions is the only form of Napi. Bryoniæ produces but one generation a year, and must, then, according to my theory, be regarded as the parent form of Napi." He then states that in the Alps and Jura, Napi swarms everywhere, and crossing takes place, which causes variability in Bryoniæ, but in Lapland Napi is never met with; so Bryoniæ preserves its constancy, and concludes thus: "Pieris Bryoniæ should be elevated to the rank of a species, and ordinary winter and summer forms should be designated varieties Napi and Napææ." Then Mr. Edwards, after a description of the markings of the various forms, says, "There are therefore the three forms under which the species manifests itself in Europe, Bryoniæ, Napi, Napææ; of which Bryoniæ may be considered the present form." Now to get myself into harmony with nature, I have to reverse this order. We all know that butterflies are lovers of the sun; and that they are most numerous in kinds and examples in warm countries where they flourish most luxuriantly, the conditions being more congenial to them. Therefore the natural inference is, that butterflies would first appear on this scene of life, in localities that were most favourable to them, and spread from these into those that were less so. We are all familiar with the restlessness of butterflies, and with what eagerness they will investigate every spot, seemingly with a determination to establish themselves there if possible; they succeed if the conditions are at all favourable, and some of them succeed even where the conditions are most unlikely. Now as Bryoniæ is a darker form than Napi, and Napææ being lighter still, and taking the result of Mr. Edwards's experiments in this direction as a clue to some of nature's methods in this matter, which goes to show that cold has the effect of darkening the colour of some kinds, I infer that Napææ was the first to appear and to spread into a locality with a cold winter. This acting on the chrysalides, Napi appears as the spring form, and Napææ as the summer one. As the distribution goes on it reaches a yet colder climate, where Napææ disappears and Bryoniæ is the spring form, with Napi as the summer one. Pushing yet onward it gets into a locality where the season is too short for two broods, when the single brooded Arctic and Alpine Bryoniæ is alone to be found, and consequently constant, and there does not seem to be the slightest reason to doubt, that if every Bryoniæ was swept out of Europe in one season, their place would soon be filled from the warmer plains below, and that they would be just as true Bryoniæ as those of the present —the result of the influence of climate on an impressionable organism, and the power of that organism to accommodate itself to altered conditions.

Now, then, let us return to our poor old friend Semidea, who has been having such a weary time of it on top of Mount Washington, for the last eighty thousand years. I do not know the form of Chionobas that flies on the plains of New Hampshire. I am dealing with one of the laws of nature that controls life, a far more reliable guide to correct conclusions, than the changeable external appearance of insects. But whatever they may be like, or by whatever name they may be called, I am quite confident, that upon investigation one of them will be found to stand in the same relation to Semidca that Napi does to Bryoniæ, and will be found capable of pushing its way up Mount Washington and to be modified by the changed conditions, and by the time it has established itself on the top it has become true Semidea; so that if at any time Semidea had been obliterated from Mount Washington by the severity of the conditions, and it would seem little short of a miracle if it never has been, its place could yet be filled from below.

Then there is *Semidea* in the Mountains of Colorado. The Chionobas of the Colorado plains, will undoubtedly be different-looking from those of New Hampshire and discerned by bearing different names, and from one of them the Semideas have come which are found on the mountains; the same principle governing one as the other. We turn to Labrador and the same principle is at work there, only the conditions for the production of Semidea are obtained without the necessity for the elevation. So that from Labrador within the Arctic circle, to Long's Peak, Colorado, an unbroken chain of that species extends across the 2,800 miles that lie between, every link of which may differ somewhat from the one next to it, according to the conditions in which it lives, and be entitled to a distinguishing name, yet all united by the laws of consanguinity. At these three points, Labrador, Mount Washington and Long's Peak, Colorado, the conditions being the same, like results are produced and Semidea is the natural outcome. And according to Mr. Edwards, when specimens are brought from these widely separated localities and compared, they are not known to differ by a scale or a hair. I see that Mr. Scudder does not consider the Labrador form quite the same as the others, if so it would indicate that the conditions are not quite identical.

Mr. Edwards inform us that the Satyrinæ are a very numerous family, with many genera, these having numerous species, which I take as an indication that they are sensitive to external influences and readily modified thereby, and probably a full series might exhibit the gradations to be slight.

This, then, is the view I take of the way in which Arctic forms have been originated and perpetuated, and the principle at work in producing them is that which has been so carefully elaborated with such a wealth of illustration and knowledge of facts by Wallace in his Island Life; only he calls the forms produced by changed conditions "species" instead of varieties of a species, a mode of using the term that is ever liable to lead to confusion and misunderstanding.

FULLER'S ROSE-BEETLE.—(*Aramigus Fulleri*, Horn).

BY JAMES FLETCHER, OTTAWA.

From time to time complaints come to us of injuries done to greenhouse plants by some insect which gives abundant evidence of its presence, by the nibbled state of the leaves; but which is seldom detected. When such complaints are received, it is suggested that a light be taken into the greenhouse and search made at night. In most instances the culprit is found to be a small brown snout-beetle, shown at Fig. 28. This is known as Fuller's Rose-Beetle. There is no doubt that this insect is far commoner than is generally supposed. Its habit of feeding at night and hiding during the day time, added to the protection afforded it by its colour, saves it from detection until it attracts notice by its excessive numbers.

This is a comparatively new enemy, having only been described in 1876, when Dr. Horn named it after Mr. A. S. Fuller, who first brought it to his notice. It had however, been sent to Dr. J. A. Lintner, State Entomologist of New York, two years previous to that date.

A good deal has been written in different journals and reports upon the best way to overcome this pest; but it still keeps turning up in new localities every year, and is now reported as a greenhouse pest from the Atlantic to the Pacific coast.

Accounts of its life-history and habits are given in the Annual Report of the United States Entomologist for 1878, and Dr. Lintner's report for 1885. From these accounts we find that this insect injures greenhouse plants of many kinds; but its favourite food is undoubtedly the rose, and after this perhaps various kinds of lilies. The injury done by the mature beetle is however slight, compared with that of the larva (Fig. 26), which is a thick white legless grub, when full grown ¼ of an inch in length, the body curved, wrinkled above and flattened below, covered with short tawny bristles. Head yellow with dark, black-tipped, sharp mandibles, with which it consumes the young rootlets of various greenhouse plants, and by the destruction of these fibres with which the plant takes its food, soon destroys the vitality of the plant. Prof. Riley says:—(Ann. Rep., 1878, p. 256). "The most serious injury is done by the larvæ, which feed principally upon the more tender rootlets and thus attack the plant in its most essential parts. I have had a quite healthy rosebush totally destroyed in three weeks' time, by about three dozen of the larvæ, which were placed in the pot containing it." When plants are attacked at the root by larvæ they have generally a characteristic appearance. The new wood is weak and spindly, the colour is unhealthy and very few flowers are produced. When this is the case they seldom recover. I have seen plants of which every one of the young rootlets were destroyed, and which threw out new roots close to the surface; but these never did much good, and florists tell me that it pays better to throw away such plants and replace them with young, vigorous bushes. There is frequently much carelessness amongst florists in not appreciating the serious nature of an introduction of this pest into their premises, and it is not at all uncommon to see plants destroyed by the larvæ, simply pulled out and other healthy plants set in the same soil. This of course is a great mistake, and is a practice which should never be followed. When roses are grown under glass in the usual way, viz.:—in beds, if the soil is found to be infested by the larvæ of this insect, it must all be

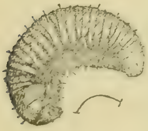

Fig. 26.

removed and fresh soil put in its place. There are several instances on record of rose-growers having given up the cultivation of this queen of all flowers, on account of the attacks of this insect; but this is not necessary, if they will learn something of its life-history and apply remedies accordingly. Prof. Riley has worked out the life-history and finds that the eggs are laid in flattened batches of from 10 to 60, the individual eggs being smooth yellow and ovoid and about one millimetre in length. They are laid by the female at the base of the plant just above the ground, and are generally pushed between the loose bark and the stem, or are laid between the earth and the main stem, just at the surface of the ground. They are so firmly glued together and to the place where they are deposited that they can only be detached with difficulty. After about a month the eggs hatch and the active little larvæ at once burrow down into the ground and begin their work of destruction. When full grown they turn to pupæ, Fig. 27, from which the mature beetles emerge in about three weeks. The perfect beetle, Fig. 28, is a brown weevil, a little more than ¼ of an inch in length, with a short thick snout and long slender antennæ or feelers, bent abruptly in the middle. The wing-cases are indistinctly striate, and bear rows of large punctures and minute hairs. A whitish stripe runs along the sides of the thorax and half way down the sides where it terminates as an oblique white dash, reaching to the middle of each wing-case. Prof. Riley says: "The parent beetles, like most other snout beetles, live for a considerable time, as I have kept them in confinement for nearly three months. They are nocturnal in habit, being quite active and feeding only after dusk. They shun the light during day-time and hide under the leaves or cling tightly to the branches or in some fork near the base of the plant, always in such position as not easily to be observed. They drop to the ground when disturbed, draw up their legs and 'play possum,' remaining motionless for some time and looking very much like a small lump of dry earth, the colour adding greatly to the resemblance. This habit of simulating death upon disturbance is common to many other insects of this family. They feed upon the leaves, but do more injury by severing them than by the amount of foliage consumed."

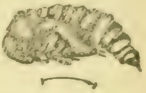
Fig. 27.

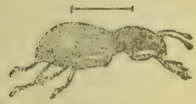
Fig. 28.

"The beetle seems to be purely American, and the genus Aramigus was in fact erected for it and another species (*A. tesselatus*), of about the same size, but of a silvery white colour, with faint green hue, which I have found in Kansas upon the well-known 'resin weed.' The beetle belongs to the same family, and is pretty closely allied to a well-known European beetle, *Otiorhynchus sulcatus*, Fab., which is larger and darker in colour, and is also very injurious to greenhouse plants, as well as to some grown out of doors. This species also occurs in this country." The last-named beetle has been taken by Mr. Harrington at Sydney, Cape Breton, but has never yet been reported as an injurious insect in Canada.

Remedies.—Probably the most satisfactory remedies for this pest are those which are directed towards the destruction of the mature beetles. As stated above these are very retentive of life. They can, however, certainly be conquered by constant watchfulness and by keeping the plants in the house where they occur frequently sprayed all the time the perfect beetles occur with weak arsenical mixtures. Paris green of the strength of 1 lb. to 300 gallons of water is strong enough to destroy the beetles and will not injure the plants if kept well mixed all the time it is being used. Mr. Alderman Scrim, of Ottawa, an extensive grower of roses and other plants for winter cut-flowers was very successful in trapping the beetles by means of the small bamboo canes commonly used by florists for supporting potted plants in greenhouses. These were cut so that there was an open joint about three inches in length at the top. Into this chamber so formed the beetles would crawl to hide during the day, and were easily and quickly crushed by pushing a small rod down the cane every morning without removing the cane. In this way Mr. Scrim destroyed large numbers at a time of the year when it was inconvenient to renew all the soil in his rose-houses. Prof. Riley quotes in his 1878 report from an account written by the late Mr. Peter Henderson, of New York, of the work of this beetle. After stating his belief that the failure of many to grow roses is due to the unknown presence of the larvæ at the roots, he says as follows: "Mr. John May, the gardener in charge of Mr. Slaughter's rose-growing establishment at Madison, New Jersey, which is probably the largest in the vicinity of New York, has given great attention to the rose bug, his roses for four or five years being much injured by it; but by persistent efforts in destroying the perfect insect, he has now got entirely clear of it."

Experiments to destroy the larvæ and pupæ in the ground by means of bisulphide of carbon were unsuccessful.

Prof. Riley having discovered the habits of the insect as to the deposition of its eggs suggested the value of placing traps, composed of rags, tape or paper tied round the stems of the plants or round short sticks placed close to the plants. In these the females would lay their eggs. The eggs take about a month to hatch, and by scalding the rags at short intervals all the eggs would be destroyed. If the plan of tying rags to sticks be adopted these can be dipped in scalding water and again replaced at once without untying the rags.

With this as with most of the other injurious insects the most important thing is for the florist to recognise the serious nature of the attack and the necessity of carrying on the war unceasingly until every appearance of the enemy ceases.

HYMENOPTERA PARASITICA.

BY W. HAGUE HARRINGTON, OTTAWA.

In his excellent work entitled a "Synopsis of the Families and Genera of the Hymenoptera of America, north of Mexico," Mr. E. T. Cresson gives the following concise statement of the general characters of the order Hymenoptera.

WINGS four, membranous, the posterior pair almost always smaller than the anterior, with comparatively few nervures.

MOUTH mandibulate, and with a lower lip or tongue, sheathed by the maxillæ.

TARSI generally 5-jointed, rarely 3 or 4-jointed, very rarely heteromerous.

ABDOMEN of the female furnished with a multivalve saw ovipositor, a borer, or a sting.

LARVA vermiform and footless, except in the Phyllophaga and Xylophaga.

PUPA incomplete and inactive.

Keeping these definitions in view it will be seldom difficult even for those who are not entomologists to decide whether a certain insect belongs to the Hymenoptera. Many flies (order Diptera) have a close superficial resemblance to species of Hymenoptera, but they may at once be distinguished on an examination of the wings, of which they invariably have only *two*.

Again insects may be found with four membranous transparent wings, as dragon flies (order Pseudoneuroptera) or cicadas (order Hemiptera), but in these orders the wings have a great number of nervures, or veins, forming a close network, and in all hemipterous species (bugs) the mouth is transformed into a proboscis, and lacks the mandibles or jaws common to Hymenoptera, and which are very apparent in large species like the bees.

We are informed that the abdomen of the female is furnished with a saw ovipositor, a borer, or a sting, and the order can be roughly divided into three sections based upon these differences in the sexual organs. The first section may be styled Phyllophaga (leaf-feeders), and contains the well-known saw flies, the larvæ of which are caterpillar-like and possessed of feet. The second section includes the Xylophaga (wood-feeders), generally known as horntails, the larvæ of which infest the trunks of trees, and the Parasitica (parasites) to which belong the long-stings and numerous allied forms. The third section Aculeata (sting-bearers) contains the bees, wasps, ants, etc.

Of the first and third sections as above indicated I have in former reports treated briefly, and I will now endeavor to outline the Parasitica, which constitute almost the entire second section, and which by reason of their great number and complexity of structure will make my task a difficult one to undertake in a single paper.

The section Parasitica contains at least half of the described species of our Hymenoptera, and the number of undescribed forms must be very large, as many of them are extremely minute and require more careful collecting and study than many entomologists can devote to them. They are divided into several families, of which some contain a large number of genera and species, and which will be briefly treated of in systematic order.

Cynipidæ.—This family contains a moderate number of small species (often minute) and is divided into two sections, one containing three and the other two subfamilies. The species contained in the first section are in the larval state chiefly producers of galls, or dwellers therein, instead of being truly parasitic in their mode of life. There is reason to believe, however, that the few species which constitute the first subfamily (Ibaliinæ) are true parasites upon the larvæ of wood-boring insects. The principal Canadian species is *Ibalia maculipennis* Hald., which occurs somewhat rarely on maple and beech. The structure of the insect is such as to attract attention, for though of moderate size (hardly three-fourths of an inch in length) it is still the largest of our Cynipidæ, and is easily distinguished by its strongly compressed or knife-shaped abdomen. Within the abdomen, which constitutes merely a sheath for it, is coiled a delicate ovipositor, much longer than the insect itself, with which it deposits its eggs in the decaying trunks of the beech and maple, where the larvæ when hatched probably exist upon other insects infesting the wood.

The subfamily Cynipinæ contains species producing galls upon plants. The trees most subject to their attacks are the various species of oak; the galls occurring upon them and the insects produced therefrom being in themselves a sufficient study for an entomologist. Some of the galls, such as the oak-apple, are of enormous size as compared with the minute grub which occupies the central cell therein, and which by some mysterious influence upon the growth of the plant structure causes this wonderful abnormal development. The various species of roses are also very liable to the attack of these insects, the galls chiefly occurring being large potato-shaped ones upon the roots, oval woody enlargements of the stems and clusters of pea-shaped swellings upon the leaves. Although various plants, including the raspberry and blackberry, are subject to these attacks there is not space to enumerate them here.

The subfamily Inquilinæ as its title indicates contains species which are inquilines or guests in the galls of the preceding species, which in structure and appearance they closely resemble.

The truly parasitic species of the Cynipidæ are comparatively few in number.

EVANIIDÆ.—The species belonging to this family are easily distinguished, as the abdomen is attached to the disc or base of the metathorax, instead of to the apex as in the other families. The species found in Canada belong chiefly to the genus Aulacus, the members of which frequent decaying trees, in which they may be found ovipositing. We have also two species of Fœnus—insects with a curious sickle-shaped abdomen—of which one (*F. incertus*) has a short ovipositor, while the other (*F. tarsatorius*) has a very long one. They may frequently be seen flying about trees, telegraph poles, etc., examining and entering insect burrows and crevices, and also upon golden-rod and other flowers in autumn. They are said to be parasitic upon certain bees. The species of Evania, which have curious hatched-shaped abdomens, are said to infest cockroaches.

TRIGONALIDÆ.—This family contains only one genus (Trigonalys) and the four species therein are of rare occurrence and not as yet recorded from Canada. Habits unknown to me.

ICHNEUMONIDÆ.—This family is a very extensive one and contains our largest and best known parasites. It is divided into five sub-families of somewhat equal size. Of the sub-family Ichneumoninæ there are more than two hundred species credited to the typical genus Ichneumon, and of these at least fifty occur in the vicinity of Ottawa. These ichneumons are somewhat wasp-like in form, but more slender; our largest species (*I. grandis*) is sometimes an inch in length, but some of the smaller species are less than one-third of an inch and the average size is about two-thirds. The ovipositor is short and retracted within the abdomen so as to be rarely visible, but the females may be distinguished by their stouter abdomens, and frequently by the antennæ being rolled, while those of the males are longer and straight. The anterior wings have a small pentagonal cell called an areolet, which occurs also in many other Hymenoptera, (see wing of Cryptus, Fig. 29) although the areolet is incomplete, triangular, rudimentary or wanting in many genera. Many of the ichneumons are entirely black (or with a few white markings,) others have the abdomen red, others again are banded with black and yellow, or are ferruginous with black markings. They are parasites of the caterpillars of our butterflies and moths. The genus Amblyteles contains a number of species almost identical in appearance with those of the preceding genus and of similar habits. Hoplismenus is distinguished by having pointed tubercles or spines upon the metathorax. A common and well marked species is *H. morulus*, which is a parasite of certain butterflies. The genus Trogus contains a few large species of which *T. exesorius*, a yellow species with smoky wings, is a common parasite of the caterpillars of our Black Swallow-tail butterfly, *Papilio asterias*.

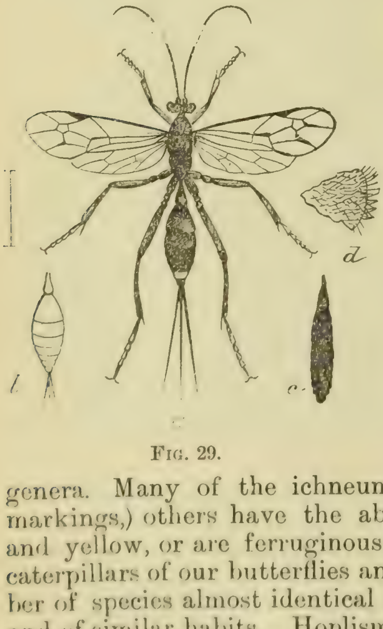

FIG. 29.

CRYPTINÆ.—Cryptus, the typical genus of this sub-family, contains species very similar in shape and colouring to those of the preceding sub-family, but of smaller size and having the ovipositor exserted and sometimes quite long. A common species is *Cryptus extrematis* which I have frequently bred from the cocoons of our large moth *Telea polyphemus.* Figure 29 shows the female and Figure 30 a cross-section of the moth's cocoon, indicating how the cocoons of the parasite lie side by side within it closely packed. The genus contains a great many species, as does also the genus Phygadeuon, the species of which differ chiefly in having the ovipositor shorter. The genus Hemiteles contains small species with incomplete areolet, which are said to be secondary parasites; *i.e.* parasites of parasites, while the species belonging to Pezomachus are wingless and ant-like in shape and may be found upon the ground or on foliage.

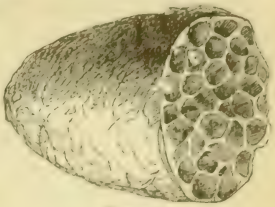

Fig. 30.

OPHIONINÆ.—The species included in this sub-family usually have the ovipositor short, and they differ from the rest of the Ichneumonidæ in having the abdomen compressed laterally, so that it becomes sickle-shaped. Some of the larger forms show this in a marked degree. The typical genus Ophion contains large yellow insects of which some are very abundant. Our largest species is *Ophion macrurum* (Figure 31) which is a parasite of the caterpillar of the large American silkworm moth (*Telea polyphemus*). The larva of the ophion is a large, stout grub, which when full grown spins a dark brown cocoon which almost fills the cocoon of the moth, and from which the fly emerges by cutting a circular door at one end. *O. bilineatum* infests the White Miller moths, while *O. purgatum* (which has two yellow specks in one of the cells of the anterior wing) is a parasite of the army worm.

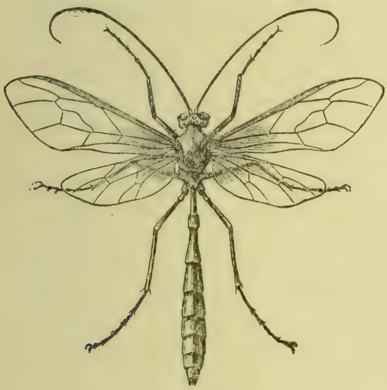

Fig. 31.

Thyreodon morio is a fine insect of nearly the size and shape of *O. macrurum,* but of a deep black colour, with dark, smoky wings and yellow antennæ. The genera Exochilum and Heteropelma contain a few large species of the same general appearance, while *Opheltes glaucopterus* might be mistaken for *Ophion macrurum,* except that there is an areolet in the anterior wing and that the terminal segments of the abdomen are black. This fine species has been bred by my friend Mr. Fletcher from the cocoons of *Cimbex Americana,* the great Willow Sawfly.* Anomalon and Campoplex contain a large number of species of moderate size, with the abdomen long and very thin. They are parasites of caterpillars, such as the destructive Tent caterpillars, and they do good service in keeping down such pests. Another large genus of very beneficial species is Limneria, but in this and the remaining genera of the sub-family the species are mostly small. Figure 32 shows *Thersilochus conotracheli* a parasite of the plum weevil. In Banchus the scutellum is often armed with a sharp spine.

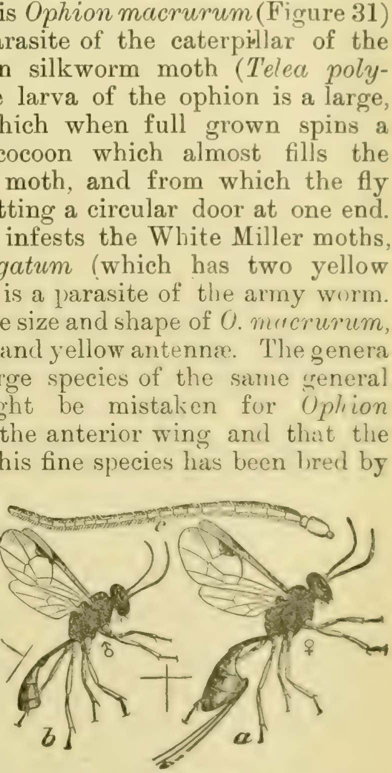

Fig. 32.

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* Canadian Entomologist, Vol. XIX, p. 80.

TRYPHONINÆ.—In this and the following sub-family the abdomen instead of being compressed laterally and thus being more or less knife-shaped, is cylindrical or flattened vertically, especially the basal segment, which instead of forming a slender petiole, is in the majority of genera attached to the thorax by its full width. In the present sub-family the ovipositor is short and not exserted. There are a number of genera, of which Mesoleptus and Tryphon are the most important, but without figures it would be difficult to satisfactorily describe any of the species. Euceros is distinguished by its flattened antennæ and Chorinæus by having one or two segments of the abdomen longitudinally keeled above, as in the genus Rhogas of the Braconidæ.

PIMPLINÆ.—This sub-family contains many fine species, including the largest and most striking of all our Hymenoptera. The structure of the abdomen is generally as in the preceding sub-family, but the exserted ovipositor is usually at least half the length of the abdomen, and not unfrequently is much longer than the whole body of the insect. This development of the ovipositor is due to the fact that the victims of those species in which it is very long are usually wood-borers, dwelling in burrows in the wood or under the bark of various trees and apparently secure from the attacks of the enemies of more exposed species. Arotes contains several handsome species; black, with markings of yellow or white, and with the ovipositor about the length of the insect. I have found them ovipositing in dead hickory, infested by *Saperda discoidea*, etc. Of Rhyssa there are five species recorded from Canada, of which *R. persuasoria* is also found in Europe. This is a large species, the female (with ovipositor) being 2½ inches in length. The general colour is black, with white markings, but the legs are rufous. Provancher states that this species is an especial parasite of the large pine-borers, *Monohammus confusor* and *M. scutellatus.* I have not recognized the species at Ottawa yet, but have a male apparently belonging to it from Rev. G. W. Taylor, of Victoria, B.C. The closely allied genus Thalessa contains the giants of the Parasitica, those large species popularly known as "Long-stings." Two species, *atrata* and *lunator,* are common, while three others, which may be perhaps varieties, are recorded. The specific name of *Thalessa atrata* signifies that the species is black, and this is true of the female, with the exception of the head, the antennæ and portions of the legs. The male, however, has the legs almost entirely yellow, the thorax much varied with the same colour, and the abdomen much lighter than that of the female. A large female measures fully an inch and a half from the head to the tip of the abdomen, beyond which the ovipositor extends five inches. The legs, wings and antennæ are developed in proportion, so that the motions of the insect are active and she flies strongly. The size of these insects and their curious method of oviposition (egg-placing) have made them objects of much interest to entomologists. Their larvæ are parasites (feeding externally) of the grubs of the wood boring "Horn tail" called *Tremex columba.* I am sorry that space does not permit me to give a fuller account of their habits, which have been very carefully worked out by Prof Riley. In *T. lunator*, which is a somewhat smaller species and more variable in size, the thorax and abdomen are largely marked with yellow. To those who wish to observe these insects I may say that they can generally be found about old maples and beeches in midsummer.

The genus Ephialtes contains several fine species having the abdomen tuberculate along the sides and the ovipositor as long as the insect itself. *E. irritator*, which I have taken on dead hickory in June has the abdomen and legs red, but other large species such as *gigas* and *occidentalis* are black, with the exception of the legs.

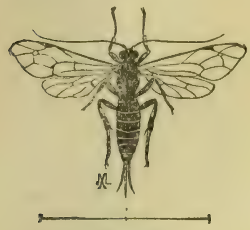

FIG. 33.

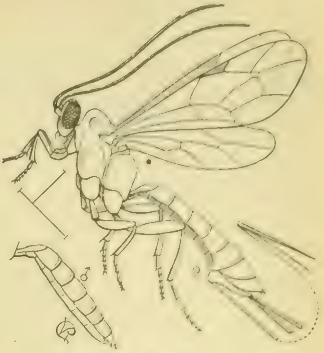

FIG. 34.

Pimpla, the genus from which the sub-family takes its name, contains a number of very useful species of which *P. conquisitor* (Figure 33) is a great aid in checking the ravages of the Forest Tent-caterpillar. I observed it to be very abundant in 1889. This species has the segments of the abdomen margined with white, but in our other species the thorax and abdomen are entirely black. The legs, however, as in this species, are usually red, and more or less variegated with black and white. Our largest species, *P. pedalis*, also an enemy of Clisiocampa, has the legs red, with the exception of the hinder tibiæ and tarsi, which are black, while *P. pterelas*, which can be bred in large numbers from pods of iris infested by the beetle *Mononychus vulpeculus*, has its legs entirely red. A very closely allied species *P. annulipes* (Figure 34) is said to be a parasite of *Carpocapsa pomonella*, the Codling moth, whose larvæ do such enormous damage to our apples.

Differing from Pimplas chiefly in colour are two yellow species belonging to the genus Theronia. In Victoria, B.C., in May, 1888, I observed *T. fulvescens* to be very abundant and as it is a parasite of the western Tent-caterpillar, which was then in immense numbers, I have no donbt that the insects were then engaged in the good work of depositing their eggs in the obnoxious caterpillars. The species which occurs here is called *Theronia melanocephala* from its black head, and I have bred it from cocoons of *Halesidota maculata*.

The sub-family contains many other genera, some of which, as Xorides, Xylonomus, Ecthrus and Odontomerus, include large handsome species.

STEPHANIDÆ.—This family only contains two genera, and the American species described are only four in number. They are rare in collections, and none are yet reported from Canada I think. In appearance they much resemble some species of the next family, and having long ovipositors are probably parasites of wood-borers.

BRACONIDÆ.—The described species of this family are not so numerous as those of the ichneumonidæ, nor are they so large, but they include many interesting forms, and many of great use in keeping down noxious insects. The braconids are distinguished from the ichneumonids by the venation of the anterior wings, which lack the cross-vein known as the second recurrent nervure. On examining the wing of Cryptus, for instance, (see Fig. 29) there is seen just below the areolet (or little pentagonal cell) a cross-vein, but if the wing of a Bracon (see Fig. 35) is examined it will readily be seen that there is no trace of a corresponding cross-vein. In the braconids also (except in one small section) the second and third segments of the abdomen are rigidly connected, instead of being flexibly jointed. They are separated into five divisions, which are further divided into sub-families.

CYCLOSTOMI.—In this division the clypeus (or portion of face just above the mouth) is emarginate, thus forming a semi-circular opening above the mandibles or jaws. There are nine sub-families, but the majority of the species are contained in the genera Bracon and Rhogas.

The larger species of Bracon are usually black, with bright red abdomen, dark, smoky wings, and a long ovipositor. They may be seen upon dead trees, and are largely parasitic upon the larvae of beetles which infest the trees. The larva of the Bracon spins a tough oval cocoon, perfectly flat above and below. Such cocoons can frequently be found under the bark of maple, cedar, etc., in the burrows of the beetles upon which the parasites preyed. The smaller species are reddish or yellowish, and infest dipterous and other larvæ. Fig. 35 shows *Bracon charus* which is said to be a parasite of *Chrysobothris femorata*, the flat-headed apple tree-borer.

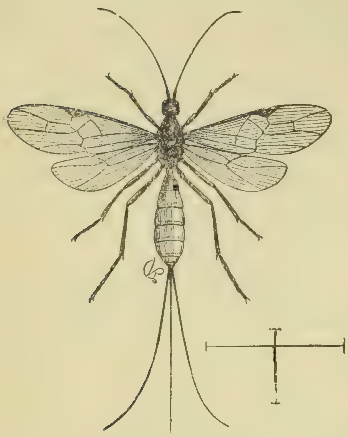

FIG. 35.

The species of Rhogas differ from Bracon in having the ovipositor short, the wings transparent, and especially in having the first segments of the abdomen carinate. *R. intermedius* is a medium sized yellow species which I have frequently bred from a handsome caterpillar (*Acronycta* sp.)

Many larvæ live in one caterpillar, which dies from the attack when it is about full grown. The victims may frequently be seen extended on stems of grass, apparently at rest, but on closer examination are found to be stiff and hard, and perhaps riddled with minute holes from which a score or more of the flies have issued.

CRYPTOGASTRES.—The species included in this division are easily recognized by the form of the abdomen which, instead of consisting of several segments, with sutures (or joints) between them, seems to be in one piece. This shield-like abdomen, however, consists of the first three segments welded together. It conceals the ventral segments, and thus gives the name to the division, which contains the two sub-families, Sigalphinæ and Cheloninæ.

Fig. 36 shows very clearly the male and female of *Sigalphus curculionis*, which is one of the parasites of the plum-curculio.

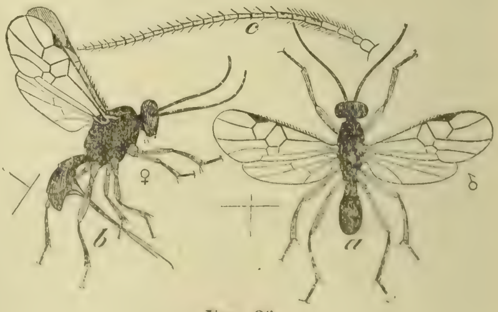

FIG. 36.

AREOLARII.—In this division the distinguishing feature is in the venation of the wing, in which the second submarginal is minute, forming a small triangular areolet, or often imperfect. There are two subfamilies as in the preceding division. The first includes the well-known genera Apanteles and Microgaster; each containing many species, which, though small, are of great benefit in holding lepidopterous larvæ in check. Mr. Howard (in Scudder's Butterflies of the United States and Canada) mentions no less than sixteen species of Apanteles as parasites of butterflies.

POLYMORPHI.—This division contains several subfamilies, and includes some large species, such as Helcon, but it is almost impossible without illustrations to give any satisfactory idea of the numerous genera. Fig. 37 shows, greatly enlarged, *Macrocentrus delicatus*, a parasite of the Codling moth.

EXODONTES.—This division is very poorly represented in Canada, or at least in collections. The species are small, but may be distinguished by an examination of the mouth parts; the mandibles have the tips turned outward (as the name of division indicates), and cannot therefore be used for biting.

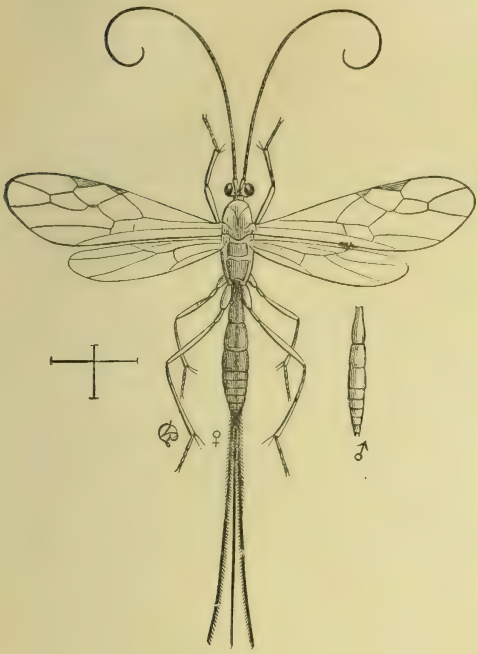

Fig. 37.

FLEXIVENTRES.—This division contains species which differ from all the other braconids in having the segments of the abdomen freely articulated, so that it can be bent under the thorax. There is only one sub-family, the Aphidiinæ, and the species are very small, yet they are of great economic importance, as they are parasites of various species of aphides, or plant-lice. The larva feeds inside the aphis, which becomes swollen, and finally is found fixed to the plant on which it has been feeding, a mere dead shell from which the tiny parasitic fly has escaped. The grain aphis is said to be kept in check by one species, which alone must save an immense sum to our farmers.

CHALCIDIDÆ.—Here we have another very extensive family; the species differing greatly in structure and in habits. They are always small, but frequently are very brilliant in appearance, glittering with bright tints and metallic lustres. It will only be possible to glance at a few of the forms, as the great diversity of structure which obtains among them, and their minuteness make their study and identification difficult except for one who can devote much time to it. The wings have scarcely any traces of venation, except the vein along the front edge.

Leucospis affinis is our largest species; a black and yellow fly about one-fourth of an inch long, with its ovipositor curved up over the abdomen in a curious manner. It is frequently found on golden-rod, and is a parasite of bees.

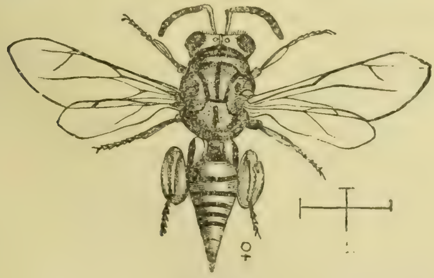

Fig. 38.

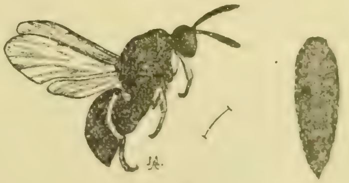

Fig. 39.

Smicra and Chalchis contain species remarkable for the development of the hind legs. Fig. 38 shows *Smicra mariæ*, which is a parasite of the Cecropia caterpillar, and Fig. 39 gives *Chalcis flavipes* which attacks the larva of the cotton moth.

The genus Torymus contains a number of species, which may be bred from different galls. The females have the abdomen flattened ovate, and sometimes prolonged to an acute point; the abdomen of the males is very small, and the insects are black. A not uncommon species is *T. gigantea*, which is bred from the large globular galls produced on stems of golden-rod by a fly (*Trypeta solidaginis*), about the size of a house fly, with mottled wings.

The closely allied genus Isosoma contains species which depart from the parasitic habits of the majority of the family, and become themselves noxious insects. *Isosoma hordei* (Fig. 40) is the well-known Joint-worm of wheat and barley straw, making gall-like swellings at the joints, in which several cells may be found, each containing a little grub.

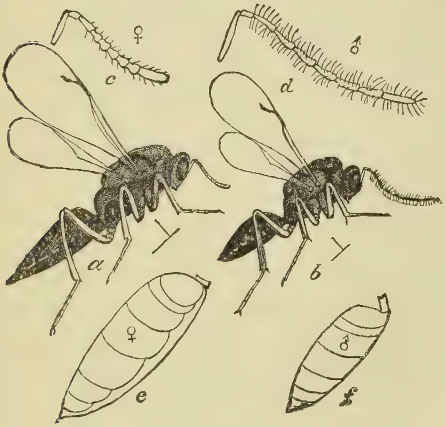

Fig. 40.

The sub-family Pteromalinæ contains, amid a great complex of tribes and genera, a correspondingly great number of species. The typical genus, Pteromalus, alone contains more than 30 species, of which some are well-known parasites of butterflies. *P. puparum* is recorded as bred from eleven species of butterfly, and is a common destroyer of the chrysalids of the cabbage white butterfly (*Pieris rapæ*) and of *Vanessa antiopa.* I have counted more than 450 flies from one pupa of the latter, and sometimes scarcely an uninfested chrysalid can be found. The species of Tetrastichus are also frequently parasites of butterflies, while *T. esurus* (Fig. 42) has been bred from the cotton moth. The genus Trichogramma (which constitutes a sub-family) also has similar habits, and *T. minutum* (Fig. 41) is a parasite of our large Milkweed Butterfly (*Danais archippus*).

Proctotrupidæ.—This family has been but meagrely investigated in Canada, although the species are numerous, and often of interesting structure. They are not so varied in coloring as the Chalcididæ, to which they are closely related, but are usually brown or black. Many of them are wingless, living among low herbage and moss, and some of the genera consist of species so minute that they live and mature in the eggs of other insects. I have found clusters of moths' eggs from each of which, instead of a young caterpillar, has issued a perfect winged fly (*Teleas orgyiæ.*) Those of Scelio infest, I believe, the eggs of grasshoppers or crickets.

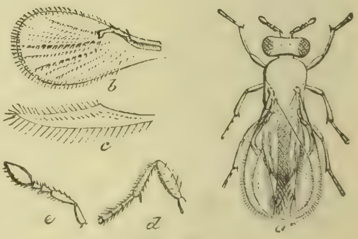

Fig. 41.

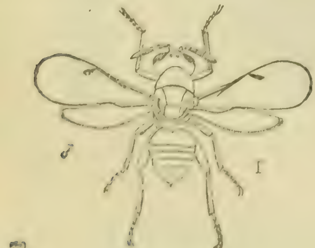

Fig. 42.

Pelecinidæ.—This family is a very easy one to study, as it contains only one species, *Pelecinus polyturator*, the shape of which is so different from all other hymenoptera that it can be quickly recognized. This fine insect is of a glossy black, with short wings, containing few veins. The male has a club-shaped abdomen, but the female has hers greatly elongated—about five times the length of her head and thorax—her total length is about two inches. The females are not uncommon, and generally fly near the ground, but their habits are otherwise unknown. I have taken them as far eastward as Nova Scotia, but I do not know how far westward their range extends. The male is exceedingly rare, and I have only seen one specimen that was captured in Ontario.

Although this review of the great complex of insects embraced in the Parasitica has been a very rapid and incomplete one, I hope that it has at least given some idea of their great number, their diversity of structure and their economic importance. We see that egg, larva and pupa are alike subject to their attacks, and that scarcely any form of insect defence appears to be sufficient to prevent their attacks. The grub gnawing his hidden burrow in the tree, and the scale insect adhering firmly to the twig, alike have their parasitic foes differing in size and method of attack.

It will be observed further that the value of any species in destroying obnoxious forms does not depend upon its size or strength. The greatest benefits are often effected by atoms so minute as almost to escape our search, but which by their numbers work wholesale destruction to their victims. The tiny fly that destroys a cluster of eggs is a greater helper than the larger one that might later destroy the brood of caterpillars, because in the latter case a certain amount of depredation is committed before the labours of the parasite are fulfilled. The diminutive devourers of aphides are of unknown value, as plant-lice increase so enormously by rapidly succeeding generations that if it were not for such providential safeguards they would swarm everywhere working devastation.

INSECTS INJURIOUS TO THE ELM.

BY F. B. CAULFIELD, MONTREAL.

First are insects injurious to the trunk.

1. The Common Elm-tree Borer, *Saperda tridentata*, Oliv, Order Coleoptera, Family Cerambycidæ.—A very destructive insect, boring in the inner bark and the surface of the wood of elm trees. Fitch states that the eggs are deposited in June and that the young larvæ nearly complete their growth before winter, and soon after warm weather arrives in spring they pass into the pupa state. Packard, who has found the larva in abundance in spring in Providence, under the bark of old dead elms, describes it as follows :—" White, sub-cylindrical, a little flattened, with the lateral fold of the body rather prominent ; end of the body flattened, obtuse, and nearly as wide at the end as at the first abdominal ring. The head is one-half as wide as the first prothoracic ring, being rather large. The prothoracic segment, or that next to the head, is transversely oblong, being about twice as broad as long ; there is a pale dorsal corneous transversely oblong shield, being about two-thirds as long as wide, and nearly as long as the four succeeding segments ; this is smooth, except on the posterior half, which is rough, with the front edge irregular and not extending far down the sides. Fine hairs arise from the front edge and sides of the plate, and similar hairs are scattered over the body and especially around the end. On the upper side of each segment is a transversely oblong ovate roughened area, with the front edge slightly convex, and behind slightly arcuate. On the under side of each segment are similar rough horny plates, but arcuate in front, with the hinder edge straight.

It differs from the larva of *Saperda vestita*, Say, in the shorter body, which is broader, more hairy, with the tip of the abdomen flatter and more hairy. The prothoracic segment is broader and flatter, and the rough portion of the dorsal plates is larger and less transversely ovate."

These destructive grubs by tunnelling and undermining, loosen large portions of the bark, stopping the flow of sap, weakening and finally killing the tree.

The perfect insect is a flat-bodied beetle, measuring from four to six-tenths of an inch in length. It is of a rather dark brown colour above, with a grayish tinge caused by a coat of very short downy hairs. The under surface blueish gray. The basal joints of the antennæ are blackish brown, the remainder paler. A line of orange encircles each eye, and a stripe of the same colour runs from the antennæ to the hind margin of the thorax, and is continued along the edge of the wing-covers where they are bent down over the sides of the body, getting narrower gradually until it reaches the tip. From this border, three branches or teeth run obliquely towards the inner edge of the wing-covers, the middle one being the longest. There are six small black spots on the thorax, two on top just behind the antennæ, and two on each side below the orange stripe, and at each angle of the stripes on the wing-covers, there is a small dark patch or spot.

Any trees known to be attacked by borers should be cut down in the fall or during the winter, and used for firewood, care being taken not to leave any exposed during the summer; particularly in June and July, as at this time most of our borers deposit their eggs. It follows, therefore, that no freshly cut, or fallen trees, or branches should be left lying about, and if cordwood is piled, it should be covered, as the borers will surely find all newly felled wood if left exposed, and where such carelessness is permitted, will congregate and multiply year after year.

2. THE LATERAL ELM BORER, *Saperda lateralis*, Fab, Order Coleoptera, Family Cerambycidæ.—This beetle very closely resembles the preceding species, and its habits appear to be the same; it differs somewhat in markings, as the orange border on the wing-covers wants the three teeth running towards the inner margin. It bores in the inner bark of the elm, appearing in June, but seems to be less common than *Saperda tridentata*.

3. THE SIX-BANDED DRYOBIUS, *Dryobius sexfasciatus*, Say, Order Coleoptera, Family Cerambycidæ.—According to Dr. Fitch, the larva of this species is similar to that of *Saperda tridentata*, and is found along with it; it is, however, larger than that species.

The perfect insect is a black beetle measuring from three-fourths to seven-eighths of an inch in length. The general colour is black, the thorax deeply margined with yellow, and each wing-cover is ornamented with four oblique bands of the same colour; the scutel, as entomologists name the little triangular piece at the base of the wing-covers, is also yellow. The antennæ are reddish brown, the legs reddish, the thighs being dilated or swollen, the abdomen is banded with yellow. I do not find this species on the Society's list of Canadian beetles, but think I have seen it recorded by a Canadian entomologist.

4. THE SHORT-LINED DULARIUS, *Dularius brevilineus*, Say, Order Coleoptera, Family Cerambycidæ.—This is a large black longicorn beetle, with dark blue wing-covers, not covering the whole of the abdomen; a rounded thorax, flattened above and the thighs very much swollen. "The antennæ are about two-thirds the length of the body, flattened towards the end, and somewhat serrate. The body above is velvety black, and brown black beneath. The head is black and coarsely punctured, and the prothorax is covered with short, dense, black hairs, like velvet. The wing-covers are Prussian blue in colour, bent, corrugated, with an interrupted ridge just outside the middle of each cover. They are covered with fine black

hairs, bent over. There is a pair of parallel short honey-yellow lines in the middle of each wing-cover, with a third one a little in front, making in all six streaks. The legs and feet are black. It is a little over eight-tenths of an inch in length." (Packard).

Bores in elm trees. Mr. George Hunt has observed this species inserting its eggs in the crevices of the bark. Occurs in Ontario and Quebec, but apparently is not abundant.

5. THE RED-HEADED CLYTUS, *Neoclytus erythrocephalus* Fab, Order Coleoptera, Family Cerambycidæ.—This pretty little beetle bores in the elm and also in hickory, etc. " It is about one-third of an inch long, and hardly one-tenth of an inch wide, the thorax being very cylindrical and as wide as the wing-covers. The colour is a rusty red, the head being of a lighter red, whence the name *erythrocephalus*, from two Greek words signifying " red-head." The antennæ are about one-half as long as the body ; the elytra have four narrow yellow bands across them, and the legs are long and slender, especially the hinder pair, which are almost twice as long as the body. This beetle is exceedingly quick in its movements, and is difficult to capture as it runs swiftly, and take to flight instantly, if disturbed." (Harrington). This species has been taken on hickory by Mr. W. H. Harrington and has been bred from that tree by Drs. Leconte and Horn. It has been found under the bark of an old sugar maple by Mr. G. Hunt, and bred from oak by Dr. Riley. It has been found boring in dead elms in Michigan by Hubbard, and I have myself found it at Montreal on a fallen red oak, so that it appears to infest various kinds of forest trees.

At least two species of bark-beetles are known to infest the elm. The *Scolytidæ*, to which family they belong, are all of very small size. The female drives a long gallery between the bark and the wood, depositing an egg at intervals as she progresses ; each larva when hatched drives a tunnel at almost a right angle to the main gallery, and when its transformations are completed, cuts a hole through the bark, through which it escapes. A tree infested by these insects, looks as if it had been riddled with shot, and the surface of the wood is scored in all directions with their burrows, loosening the bark and destroying the tree.

6. THE ELM BARK-BORER, *Phlœotribus liminaris*, Harris, Order Coleoptera, Family Scolytidæ.—According to Dr. Harris this little beetle " is of a dark-brown colour ; the thorax is punctured, and the wing-covers are marked with deeply punctured furrows, and beset with short hairs. It does not average one-tenth of an inch in length."

7. THE BLACK ELM BARK-BORER, *Hylesinus opaculus*, Leconte, Order Coleoptera, Family Scolytidæ.—This is a stoutly built pitchy-black beetle found under the dry bark of elm and ash trees. Both these species are given in the Society's list of Canadian beetles.

8. According to Packard, THE SNOWY TREE CRICKET, *Œcanthus niveus*, Serville, deposits its eggs in the corky bark of the elm in the Southern States. The perfect insect, Fig. 43, is a slightly formed pale green cricket, with ivory white wings ; the female, Fig. 44, with a long ovipositor. Very common in Ontario and Quebec, as far east as Montreal.

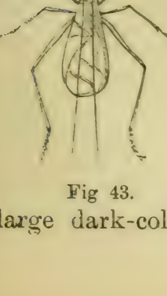

Fig 43.

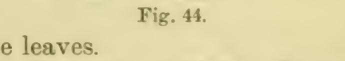

Fig. 44.

Second are insects injuring the leaves.

9. THE ANTIOPA BUTTERFLY, *Vanessa antiopa*, Linne, Order Lepidoptera, Family Nymphalidæ.—Every one who has walked through the woods in early spring, must have noticed a large dark-colored butterfly, that dashing up when approached, after circling

around for a few moments, now fluttering, and anon gliding on motionless wing, settles down again in some sheltered spot where it sits opening and closing its wings, enjoying the balmy air and bright sunshine that once again awakens nature from her death-like sleep, to renewed life and activity. This is the well-known Antiopa butterfly, the "Camberwell Beauty" of the English entomologists. Antiopa passes the winter in any convenient shelter that it can find. Dr. Harris tells us that he has found it sticking to the rafters of a barn, and in the crevices of walls and stone heaps, huddling together in great numbers. It also hibernates on the ground, clinging to the under surface of stones in dry situations. The female deposits her eggs in a cluster around a twig of elm, willow or poplar ; and until nearly full grown, the caterpillars keep together. The mature larva is black, thickly dotted with white giving it a grayish appearance. On top of the back is a row of eight brick-red spots, and the body is armed with a number of strong branching spines. The first brood of caterpillars appears in June, the second in August, and the butterflies from the last brood hibernate. The butterfly is dark maroon brown on the upper side of the wings, with a broad border of yellow, thickly dotted with brown ; on the inner side of this border there is a band of black, in which is set a row of blue spots ; the front edge of the wings is marked with fine yellow lines and two spots of the same colour. A variety is occasionally met with, in which the yellow border is unusually broad, and the dark band with the blue spots is wanting.

If numerous enough to be troublesome, these caterpillars may be killed by shaking them off the branch on which they are congregated, and crushing them. This should be done while they are small, as when nearly full grown, they scatter over the trees and wander about in search of a suitable place in which to undergo their transformations.

10. THE INTERROGATION BUTTERFLY, *Grapta interrogationis*, Fab, Order Lepidoptera, Family Nymphalidæ.—This is a dimorphic species, the hibernating form being known as *Fabricii*, the other as *Umbrosa*. Fig. 45 represents *G. progne*, a closely allied species.

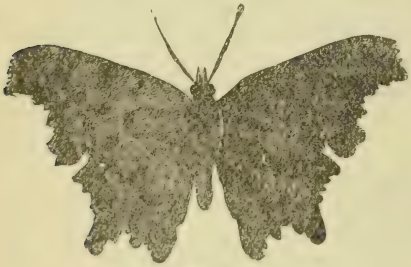

Fig. 45.

Farther to the south there are about four broods in a season, but with us only two, and while the last brood gives the pale form which hibernates, the other broods are more or less mixed, *Fabricii* has the upper surface fulvous, spotted with black and clouded with warm brown ; on the hind wings the brown predominates, the lighter colour being restricted to a patch on the upper angle, and a row of spots a little inside the outer edge ; the edges of all the wings are light purplish blue. The front margin of the fore wings is convex, the tip cut squarely off, the outer margin concave. Hind wings tailed. Under surface marbled and clouded with various shades of brown and purple, and with an interrupted C. in the middle. *Umbrosa* has the upper surface of the hind wings almost entirely black, the submarginal row of spots being absent, the fore wings are not so falcate, and the tail on the hind wings is shorter.

"The young larvæ are whitish yellow, somewhat marked with brown, head black. After the first moult their colour is black, more or less specked with white, and they begin to be clothed with short spines, all black except those on the eighth and tenth segments which are whitish. After the second moult they begin to assume the type they retain to maturity. The spines are in seven rows, fleshy at base, slender and many-branching at extremity ; the dorsal and first lateral on joint 3 are black, on joints 2, 4, and 11 russet, the rest yellow; the second laterals black throughout, the lowest row greenish, head bilobed, black, with short black spines on vertices. After the third moult the larvæ vary greatly both in colour of body and spines. Some are black, finely specked with yellowish; others are yellow-brown, specked with yellow tubercles; others gray-brown with indistinct reddish lines between the spines on the dorsal and two lateral rows, and much tuberculated; others are black with fulvous stripes and profusely covered with yellowish tuberculated spots and points. The spines vary from black to fulvous and green and yellow. (French). Feeds on elm, basswood, hop, nettle and false nettle.

Grapta comma, Harris, closely resembles the preceding species but is smaller, and the wings are not so decidedly falcate, Food plants the same.

11. THE SPRING CANKER WORM, *Anisopteryx vernata,* Peck, Order Lepidoptera, Family Phalænidæ.—Late in autumn when the leaves have fallen and the insect tribes have almost entirely disappeared, this fragile looking moth, Fig. 46, may be seen flying slowly through the deserted woods. "The fore wings of the male are ash-coloured and semitransparent, with a broken whitish band crossing the wings near the outer margin, and three interrupted brownish lines between that and the base. There is an oblique black dash near the tip of the fore wings and a nearly continuous black line before the fringe. The hind wings are plain, pale ash-coloured, or very light gray, with a dusky dot about the middle of each." (Saunders.)

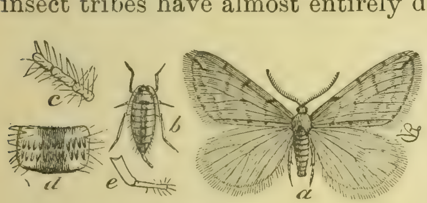

Fig. 46.

A second species, *A pometaria,* Fig. 47, very closely resembles *vernata,* but the wings are less transparent and are a little darker in colour, and the hind wings are generally crossed by a white band. The females of both species are wingless. The eggs are deposited in masses, generally in crevices in the bark. The larvæ vary in colour from greenish yellow to gray and dark brown. When fully grown they leave the trees by creeping down or else lower themselves by means of a silken thread and enter the ground to change to chrysalis. The moths generally emerge late in the fall, but some individuals do not appear until spring. To prevent the females creeping up the trees, strips of canvass or stiff paper, covered with tar or printers' ink, should be applied to the tree, renewing the covering from time to time to keep it soft and sticky, and as the moths may deposit their eggs below the band care must be taken to leave no crevices through which the young caterpillars might pass.

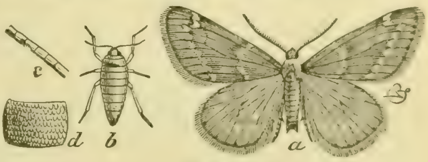

Fig. 47.

Canker worms are widely distributed, occurring in Canada as far east as Montreal at least. They feed on many kinds of leaves, and where precautionary measures are not adopted often prove exceedingly injurious.

12. THE NOVEMBER MOTH, *Epirrita dilutata,* Hubn, Order Lepidoptera, family Phalænidæ.—This moth, like the Canker worm, flies late in autumn and would be easily mistaken for that insect. The body and wings are pale ash gray, the fore wings with eight wavy black lines and double row of black dots next the margin. Fringe whitish. Hind wings with four faint wavy lines. Wings expand about an inch and a quarter. Although generally not common in this neighbourhood, it is occasionally quite abundant.

The following insects are also known to feed on the elm :

Coleoptera.—Galeruca calmariensis, Linn ; Chrysomela scalaris, Leconte ; Monocesta caryli, Say ; Graptodera chalybea, Ill ; Cotalpa lanigera, Linn ; Magdalis armicollis, Say.

Hymenoptera.—Tremex columba, Linn ; Cimbex Americana, Leach.

Hemiptera.—Colopha ulmicola, Fitch ; Eriosoma Rileyi, Thomas ; Schizoneura Americana, Riley ; Callipterus ulmicola, Thomas.

Lepidoptera.—Papilio turnus, Linn ; Ceratomia quadricornis, Harris ; Hyphantria textor, Harris ; Telea polyphemus, Hubn ; Hyperchiria io, Fab ; Halisidota caryæ, Harris ; Orgyia nova, Fitch ; Orgyia leucostigma, Abb and Smith ; Datana ministra, Drury ; Tolype velleda, Stoll ; Edema albifrons, Walk ; Clisiocampa Americana, Harris ; Clisiocampa sylvatica, Harris ; Apatela vinnula, Grote ; Apatela occidentalis, Grote ; Apatela morula, Guen ; Apatela ulmi, Harris ; Paraphia unipunctaria, Haw ; Metanema quercivorana, Guen ; Hibernia tiliaria, Harris ; Sicya mucularia, Guen ; Metrocampa perlaria, Guen ; Eugonia subsignaria, Hubn ; Nephopteryx undulatella, Clem ; Nephopteryx ? ulmi-arrosorella, Clem ; Bactra ? argutana, Clem : Lithocolletis argentinotella, Clem ; Lithocolletis ulmella, Clem ; Argyresthia austerella, Zeller.

Mr. A. F. Winn informs me that *Pyrameis atalanta*, Linn, feeds readily on elm in confinement and that he has seen *Grapta j-album* ovipositing on it.

THE ENTOMOLOGY OF SHAKESPEARE.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

Some time ago, in a list of books upon Shakespeare and his works, I noticed that there was one upon the *Entomology of Shakespeare.* The book was beyond my reach. It occurred to me that it would be an interesting study to examine for myself and find out what particulars the great moralist and prince of poets had gathered concerning insects from the folk-lore of his day and his own observation, and to what account in his plays he had turned the knowledge he had gained. Accordingly, as leisure was afforded me, I read over the plays carefully and noted down the allusions to insects that I discovered. I found that the plays contained at least 168 references to insects, viz. :—To honey-bees, 18 ; humble-bees, 5 ; wasps, 8 ; ants, 3 ; stinging-insect undesignated, 1 ; butterflies, 6 ; moths and their larvæ, 24 ; beetles and their larvæ, 11 ; gnats, 10 ; fleas, 6 ; brize-flies, 2 ; bots, 1 ; blow-flies, 16 ; flies, 22 ; sheep-tick, 1 ; louse, 8 ; cricket, 4 ; locust, 1 ; grasshopper, 1 ; spiders, 17 ; scorpions, 3. Grouped according to orders these would give : Hymenoptera, 35 ; Lepidoptera, 30 ; Diptera, 58 ; Coleoptera, 11 ; Hemiptera, 7 ; Orthoptera, 6 ; Arachnida, 20. The references which I discovered are thus distributed : The highest numbers are in Troilus and Cressida, 11 notices referring to 9 species ; Romeo and Juliet, 11 notices referring to 8 species ; and 2nd Part of K. Henry VI., 10 notices referring to 6 species. Midsummer Night's Dream, K. Henry V., Cymbeline, and King Lear have 8 notices each ; 1st Part of K. Henry IV. and Hamlet have 7 each ; The Tempest, 2nd Part of K. Henry IV., Coriolanus, Antony and Cleopatra, Titus Andronicus and Othello have each 6 notices ; The Winter's Tale has 5 ; The Merchant of Venice, Taming of the Shrew ; 3rd Part of K. Henry VI., and Pericles Prince of Tyre have 4 each ; The Two Gentlemen of Verona, Love's Labour's Lost, King John and 1st Part of K. Henry VI. have 3 each ; Merry Wives of Windsor, Comedy of Errors, Macbeth, King Richard II. and Julius Cæsar have 2 each ; Measure for Measure, As you like it, All's well that ends well, King Richard III., King Henry VIII. and Timon of Athens have each a solitary reference ; and in Much ado about nothing I could find none. The number of species mentioned is over 30. We will take them according to orders.

HYMENOPTERA.—Shakespeare's ideas of the honey-bee seem to have been somewhat confused. He was misled probably by the old-world learning newly revived in his day; and, in his allusions to the "magnanimous leaders, the manners and employments, the tribes and battles of the race," he seems to have followed in the footsteps of Virgil (Georgics, Book IV.), or of writers who were acquainted with Virgil. His Archbishop of Canterbury in King Henry V. speaks of the head of the hive as a "King." The passage in which this occurs is very fine; and I am tempted to give it in its entirety.

———So work the honey-bees;
Creatures, that, by a rule in nature, teach
The act of order to a peopled kingdom.
They have a king, and officers of sorts:
Where some, like magistrates, correct at home:
Others, like merchants, venture trade abroad;
Others, like soldiers, armed in their stings
Make boot upon the summer's velvet buds;
Which pillage they with merry march bring home
To the tent-royal of their emperor:
Who, busied in his majesty, surveys
The singing masons building roofs of gold;
The civil citizens kneading up the honey;
The poor mechanic porters crowding in
Their heavy burdens at his narrow gate;
The sad ey'd justice, with his surly hum,
Delivering o'er to executor's pale
The lazy yawning drone.
Act I. sc. 1.

It would seem too that the strange story told by Virgil—how Aristæus, son of Cyrene, sacrificed cattle and left the carcases exposed till, "wondrous to relate, bees through all the belly hum amidst the putrid bowels of the cattle, pour forth with fermenting juices from the burst sides, and in immense clouds roll along, then swarm together on a top of a tree and hang down from the bending boughs" (Georgics, Bk. IV.)—had left an impression upon his mind, for he puts in the mouth of King Henry IV., who is lamenting the behaviour of Prince Henry of Monmouth, the words:

'Tis seldom when the bee doth leave the comb
In the dead carrion.
Act IV., sc. 4.

His observations of the bees however were, in many points, correct. He noticed that they "gather'd honey from the weed" (Henry V., Act IV., sc. 1); that they took "toll from every flower" (2nd Part K. Henry IV., Act IV., sc. 4); that "drones" rob the hives (Pericles, Prince of Tyre, Act II., sc. 1; Merchant of Venice, Act II., sc. 5; 2nd Part K. Henry VI., Act IV., sc. 1); that the wasps steal the honey and kills the bees (Two Gent. of Verona, Act I., sc. 2, and Titus Andronicus, Act II., sc. 3); that the swarm deprived of its leader becomes vindictive:

The commons like an angry hive of bees
That want their leader, scatter up and down
And care not who they sting in his revenge.
2nd Part K. Henry VI., Act III., sc. 2.

With the methods pursued by the bee-masters of his day he was acquainted. Bolingbroke says:

———like the bee tolling from every flower the virtuous sweets,
Our thighs pack'd with wax, our mouths with honey
We bring it to the hive; and like the bees
Are murder'd for our pains.
2nd Part K. Henry IV., Act IV., sc. 4.

And Talbot in 1st Part of K. Henry VI., Act I., sc. 5:

So bees with smoke and doves with noisome stench
Are from their hives and houses driven away.

The "Red-hipped humble-bee" of Shakespeare is *Bombus lapidarius*. This species makes its nest very commonly under stone-piles by the road-side. It is a handsome and courageous insect; and Nick Bottom the Weaver gave the fairy Cobweb no light task when he bade him:

> Monsieur Cobweb: good monsieur, get your weapons in your hand; and kill me a red-hipped humble-bee on the top of a thistle; and good monsieur, bring me the honey-bag.
> Midsummer Night's Dream, Act IV., sc. 1.

It is to be hoped that Oberon interposed in behalf of the bee, for

> Full merrily the humble-bee doth sing
> Till he hath lost his honey and his sting;
> And being once subdued in armed tail
> Sweet honey and sweet notes together fail.
> Ibid, Act V., sc. 2.

Other passages in which bees are mentioned are The Tempest, Act I., sc. 2, and Act V., sc. 1; Midsummer Night's Dream, Act III., sc. 1, Love's labour's lost, Act III., sc. 1; All's well that ends well, Act IV., sc. 5; Comedy of Errors, Act II., sc. 1; 2nd Part K. Henry VI., Act IV., sc. 2; Troilus and Cressida, Act I., sc. 3, Act II., sc. 2, and Act V., sc. 2; Cymbeline, Act III., sc. 2; and Titus Andronicus, Act IV., sc. 1.

Shakespeare's allusions to the Wasp (*Vespa vulgaris*) convey the ideas of:

(1) *Petulance*—Tempest, Act V., sc. 1:

> Mar's hot minion is returned again
> Her waspish-headed son has broke his arrows.

See also Winter's Tale, Act I., sc. 2; 1st Part K. Henry IV., Act I., sc. 3; and Julius Cæsar, Act IV., sc., 3.

(2) *Injustice*—Two Gentlemen of Verona, Act I., sc. 2:

> O hateful hands to tear such loving words
> Injurious wasps! to feed on such sweet honey,
> And kill the bees that yield it, with your stings.

(3) *Vengeance*—Titus Andronicus, Act II., sc. 3:

> ——When you have the honey you desire
> Let not this wasp outlive, us both to sting.

In the 3rd Part of K. Henry VI., Act II., sc. 6, it is said of the defeated Lancastrians:

> For though they cannot greatly sting to hurt,
> Yet look to have them buz to offend thine ears.

The commonest species of English ants is Formica rufa. This probably is the species mentioned in 1st Part of K. Henry IV., Act I., sc. 3 by Hotspur:

> Why, look you, I am whipp'd and scourg'd with rods,
> Nettled and stung with pismires.

Among the "skimble-skamble stuff" that angered Hotspur was Glendower's talk of "the moldwarp and the ant" (Ib. Act III., sc. 1). The ant also is mentioned in King Lear, Act II., sc. 4.

LEPIDOPTERA.—To butterflies there are but few references in Shakespeare, but the few shew that the great dramatist had closely observed these beautiful objects. He knew of their metamorphoses, and says:

> ——There is a difference between a grub and a butterfly, yet your butterfly was but a grub.
> Coriolanus, Act V., sc. 5.

In his choice of an adjective to describe their wings he could not have found a more appropriate word than he has in

> ——Men like butterflies
> Shew not their mealy wings, but to the summer.
> Troilus and Cressida, Act III., sc. 3.

There is a charming suggestion of the shape of the butterfly's wings in Midsummer Night's Dream, Act II., sc. 1, where Titania bids the fairies:

——Pluck the wings from painted butterflies
To fan the moon-beams from the sleeping eyes.

(of the strange being with whom she is enamoured).

An adjective that Shakespeare applies on two occasions to the butterfly is "gilded":

And laugh at gilded butterflies.
King Lear, Act V., sc. 2.
I saw him run after a gilded butterfly.
Coriolanus, Act I., sc. 3.

What particular species he is alluding to in these passages we cannot tell—probably to one of the Fritillaries, and possibly to the "High Brown" (*Argynnis adippe*). In connection with this insect Morris writes:—"It has been well observed that all the best and highest enjoyments of man are those which, coming as they do direct from the bounteous hand of the Omnipotent himself, are not purchasable with money or any other human commodity. Every aspect under which nature is viewed throws light upon this remark and gilds it with the unmistakable lustre of truth." The under side of the hind-wings of Adippe are gorgeous with their large silver spangles and their rusty red spots. The combination of these as the insect flutters by certainly gives the idea of gilding. Other adjectives used by Shakespeare in relation to butterflies are "painted" (as above), and "summer" (Coriolanus, Act IV., sc. 6), both appropriate enough.

To moths and their larvæ we find many allusions. The canker-worm especially afforded the poet many apt and beautiful comparisons. Several of these refer to love. Who is not familiar with the words of Viola in Twelfth Night telling of the effect of unrequited love upon health:

——She never told her love
But let concealment, like a worm i' the bud
Feed on her damask cheek.
Act II., sc. 4.

There is wisdom quaintly expressed in the advice given by the suspicious Laertes to his sister:

The chariest maid is prodigal enough,
If she unmask her beauty to the moon:
Virtue itself 'scapes not calumnious strokes:
The canker galls the infants of the spring,
Too oft before their buttons be disclosed;
And in the morn and liquid dew of youth
Contagious blastments are most imminent.
Hamlet, Act I., sc. 3.

In the Two Gentlemen of Verona we have a playful conversation upon the effect of love upon the understanding:

Valentine.—Love is your master, for he masters you:
And he that is so yoked by a fool,
Methinks should not be chronicled for wise.
Proteus.—Yet writers say, As in the sweetest bud
The eating canker dwells, so eating love
Inhabits in the finest wits of all.
Valentine.—And writers say, As the most forward bud
Is eaten by the canker ere it blow,
Even so by love the young and tender wit
Is turn'd to folly; blasting in the bud,
Losing his verdure even in the prime,
And all the fair effects of future hopes.

In another passage beautiful and pathetic "grief" is the canker. The unhappy Constance speaks of her little son Arthur, who is in the toils of his wicked uncle John:

But now will canker sorrow eat my bud
And chase the native beauty from his cheek.
King John, Act III., sc. 4.

In the 2nd Part of K. Henry VI. (Act I., sc. 2) the canker is "ambition." The Duke of Gloster, replying to his wife, says:

> O Nell, sweet Nell, if thou dost love thy lord,
> Banish the canker of ambitious thoughts.

In another part of the same play (Act III., sc. 1) it is *disappointment*. The unfortunate Henry exclaims, when ill news comes from France:

> Thus are my blossoms blasted in the bud
> And caterpillars eat my leaves away.

In Hamlet it is overwrought feeling. The gentle Ophelia, mourning for the strange behaviour of her lover, says (Act III., sc. 1):

> And I, of ladies most deject and wretched,
> That suck'd the honey of his music vows,
> Now see that noble and most sovereign reason,
> Like sweet bells jangled, out of tune and harsh
> That unmatched form and feature of blown youth,
> Blasted with ecstasy.

And in Romeo and Juliet it is death:

> Two such opposed foes encamp them still
> In man as well as herbs, grace and rude will;
> And, where the worser is predominant,
> Full soon the canker death eats up the plant.

Other passages in which reference to the canker is made are Midsummer Night's Dream, Act III., sc. 2; 2nd Part of K. Henry IV., Act II., sc. 2, and Act IV., sc. 4; 1st Part of K. Henry VI., Act II., sc. 5; Coriolanus, Act IV., sc. 6; Romeo and Juliet, Act I., sc. 1.

In England the larva of one of the plume moths, *Pterophorus rhododactylus*, feeds in the buds of the rose. There is a variety of small moths that infest the blossoms, leaves and young shoots of the Queen of Flowers. Among them are:

GEOMETRINA.

Articlea badiata.
" *derivata.*
Cideria psittacata.
" *fulvata.*

TORTRICINA.

Antithesia ŏchroleucana.
Pardia tripunctana.
Spilonota roborana.
" *rosœcolana.*
Hedya pauperana.
Crœsia Bergmanniana.
" *holmiana.*
Peronea variegana.

TINEINA.

Lampronia quadripunctella.
Colophora gryphipennella.

Of larvæ that feed upon the flower-buds of the apple, one of the most destructive is that of the Figure of Eight Moth (*Diloba ceruleocephala*), one of the Bombyces. This insect is so destructive that it was called by Linnaeus, the "Pest of Pomona." The larvæ of the Winter Moth (*Cheimatobia brumata*) are also very injurious. Immediately after they are hatched they make their way to the unopened buds and burrow in them, concealing themselves from sight. The Green Pug (*Eupithecia rectangulata*) is another objectionable insect:—"The larva feeding in the young buds of the apple-trees, devouring the stamens and pistils, and protecting itself by tying together the petals" (*Stainton's Manual*, Vol. II., p. 92). By the caterpillars of a tiny moth *Hyponomeuta padellus*, belonging to the Tineina, the apple-trees are not unfrequently entirely stripped of their foliage. Besides the insects already named, at least 15 species, belonging to the groups Tortricina and Tineina, infest the English orchards.

In King Richard II., by a striking metaphor England is represented as a disordered garden, over-run with caterpillars (Act III., sc. 4). Twice the word "caterpillar" is used by Shakespeare as one of contempt; in 1st Part of K. Henry IV., Act II., sc. 2, and in 2nd Part of K. Henry VI., Act IV., sc. 4.

I find the word "moth" used three times: In the *Merchant of Venice*, "Thus has the candle singed the moth," Act II., sc. 9; in *Othello* where Desdemona speaks of herself as a "moth of peace," Act I., sc. 3; and in *Coriolanus*, "You would be another Penelope, yet they say all the yarn she spun, in Ulysses' absence, did but fill Ithaca full of moths," Act I., sc. 4. The reference in this last passage is probably to the tapestry moth, *Tinea tapetzella*.

DIPTERA.—The most numerous of Shakespeare's entomological allusions are to the two-winged flies. As a fitting image of littleness and meanness he makes use of the gnat, as where Simonides says that princes who are not given to hospitality:

> Are like to gnats which make a sound, but killed,
> Are wondered at.
> Pericles, Prince of Tyre, Act II., sc. 3.

And where Biron mocking at the love-sick King of Navarre:

> O me, with what strict patience have I sat
> To see a king transformed to a gnat.
> Love's labour's lost, Act IV., sc. 3.

But the diminutive is used with much feeling and affection, where Imogen, speaking of the departure of her banished lord, says:

> I would have broke my eye-strings; crack'd them, but
> To look upon him; till the diminution
> Of space had pointed him sharp as my needle,
> Nay, follow'd him, till he had melted from
> The smallness of a gnat to air.
> "Cymbeline," Act I., sc. 4.

There is knowledge both of human nature and of natural history, in the rebuke which Antipholus of Syracuse administered to Dromio of Syracuse.

> Because that I familiarly sometimes
> Do use you for my fool, and chat with you,
> Your sauciness will jest upon my love,
> And make a common of my serious hours.
> When the sun shines, let foolish gnats make sport,
> But creep in crannies, when he hides his beams.
> Comedy of Errors, Act II., sc. 2.

The Flea (*Pulex irritans*) is spoken of in at any rate seven passages:—"Henry V.," Act II., sc. 3, and Act III., sc. 7; "Merry Wives of Windsor," Act IV.," sc. 2; "Twelfth Night," Act III., sc. 4; "All's Well that Ends Well," Act IV., sc. 3; "Taming the Shrew," Act V., sc. 3, and 1st Part K. Henry IV., Act II., sc. 1; always in a trifling sense.

Shakespeare's allusions to the breeze-fly or gad-fly of the ox (*Tabanus bovinus*) are forcible. In Troilus and Cressida Nestor, replying to Agamemnon, to illustrate the difference between "valour's show" and "valour's worth," says that in Fortune's

> ——— ray and brightness
> The herd hath more annoyance by the brize
> Than by the tiger; but when the splitting wind
> Makes flexible the knees of knotted oaks,
> And flies flee under shade, why then the thing of courage
> As rous'd with rage, with rage doth sympathize.
> Act I., sc. 3.

And in Antony and Cleopatra, Scarus cries out against the Egyptian Queen who was hastening from the fight off Actium:

> Yon ribald-rid nag of Egypt
> . . . .
> The brize upon her like a cow in June
> Hoists sails and flies.

Of the many allusions to flies made by Shakespeare, some are used in a slighting and contemptuous sense, as when Timon of Athens calls his false friends

> Most smiling, smooth, detested parasites,
> Courteous destroyers, affable wolves, meek bears,
> You fools of fortune, trencher friends, time's flies.
> Act III., sc. 6.

Or when La Pucelle says of the dead Talbot, whom Sir W. Lucy had enquired for under many sounding titles :

Here is a silly, stately style indeed !
The Turk, that two and fifty kingdoms hath,
Writes not so tedious a style as this.—
Him, that thou magnifiest, with all these titles,
Stinking, and fly-blown, lies here at our feet.
1st Part of K. Henry VI., Act IV., sc. 7.

Occasionally the references are made vindictively, as when Iago exclaims :

——" Call upon her father,
Rouse him ; make after him, poison his delight,
Proclaim him on the streets, incense her kinsmen,
And though he in a fertile climate dwells,
Plague him with flies."
Othello, Act I, sc. 1.

At one time the fecundity of flies in hot weather, affords the poet an apt simile to denote the fickle populace:

Impairing Henry, strength'ning, mis-proud York,
The common people swarm like summer-flies ;
And whither fly the gnats but to the sun ?
And who shines now, but Henry's enemies ?
3rd Part of K. Henry VI., Act II., sc. 6.

At another it serves to indicate excessive conceit. Biron says of " figures fantastical :"

—— These summer flies
Have blown me full of maggot ostentation.
Love's Labour's Lost, Act V., sc. 2.

Often the allusion has a tragic ring, as when poor blinded Gloster cries in his despair :

As flies to wanton boys are we to the gods ;
They kill us for their sport.
King Lear, Act IV., sc. 1.

And when, in Cymbeline Sicilius Leonatus, addressing Jupiter, says :

No more thou thunder-master show
Thy spite on mortal flies.
Act V., sc. 4.

Among the references to flies are two that show how closely Shakespeare had observed these insects. In K. Henry V., Act V., sc. 1, he places in the mouth of the Duke of Burgundy the words :

Like flies at Bartholomew-tide, blind, though
They have their eyes ; and then they will endure handling,
Which before would not abide looking on.

St. Bartholemew's day comes on the 24th of August ; under the old style it would be September 4th, when the flies in the cool English autumn would be growing dull and sluggish. But an allusion shewing more close attention even than that is found in Othello, Act IV., sc. 2.

——O, ay, as summer flies are in the shambles,
That quicken even in blowing.

It is not every one who knows that the flesh-fly, *Sarcophaga carnaria* is ovo-viviparous ; but Shakespeare knew it.

The sheep-tick, *Melophagus ovinus* is mentioned once in the plays.

—— I would rather be a tick in a sheep than such a valiant ignorance.
Troilus and Cressida, Act III., sc. 3.

Other references to flies will be found in The Tempest, Act III., sc. 2 ; As You Like It, Act IV., sc. 1 ; Winter's Tale, Act IV., sc. 3 ; King John, Act IV., sc. 1 ; 2nd Part K. Henry IV., Act III., sc. 1 ; 2nd Part of K. Henry VI., Act I., sc. 2 ; Troilus and Cressida, Act II., sc. 3 ; Antony and Cleopatra, Act II., sc. 2 and Act III., sc. 2 ; Cymbeline, Act IV., sc. 2 ; Titus Andronicus, Act III., sc. 2, and Act V., sc. 2 ; Pericles, Prince of Tyre, Act IV., sc. 1, and Act IV., sc. 4 ;

King Lear, Act IV., sc. 6; Romeo and Juliet, Act II., sc. 3, and Act II., sc. 4; Hamlet, Act II., sc. 2, Act IV., sc. 3, Act V., sc. 1, and Act V., sc. 2, and Titus Andronicus, Act IV., sc. 1.

Coleoptera.—Shakespeare's allusions to beetles are very fine and telling. What can be more so than this:

> Ere to black Hecate's summons
> The shard-borne beetle with his drowsy hum
> Hath rung night's yawning peal, there shall be done
> A deed of dreadful note.
> Macbeth, Act III., sc. 4.

The expression "shard-borne," is not quite correct. The elytra of the beetle are uplifted during flight, it is true; but the gauzy wings that ply beneath them are the sustaining and propelling instruments. What particular species of beetle (if any), Shakespeare had in his mind when he penned these words we cannot tell. The Dor-beetle, *Geotrupes stercorarius*, is a striking object, and flies in the dusk, and may have attracted his attention.

Scarcely less beautiful than the reference given above, is that to *Lampyris noctiluca*:

> The glow-worm shews the matin to be near
> And 'gins to pale his ineffectual fire.
> Ibid, Act I, sc. 1.

Another fine passage is found in Measure for Measure, Act III., sc. 1.

> ——— Dar'st thou die?
> The sense of death is most in apprehension;
> And the poor beetle, that we tread upon,
> In corporal sufferance finds a pang as great
> As when a giant dies.

Here, of course the intention is not to give an increased idea of the pains of the beetle, but to make us think less of the death-throes of the giant—the giant suffers as little as the beetle.

What a conception of depth is conveyed to us in the words:

> ——— How fearful
> And dizzy 'tis to cast one's eyes so low!
> The crows and choughs that wing the midway air
> Show scarce so gross as beetles.
> King Lear, Act IV., sc. 6

By Caliban in The Tempest, Act I., sc. 2, and by the fairies in Midsummer Night's Dream, beetles are spoken of as things to be dreaded.

In the 2nd Part of King Henry IV., Act II., sc. 4, there is a very curious metaphor:

> His face is Lucifer's privy kitchen,
> Where he doth nothing but roast malt-worms.

The malt-worms are the larvæ of *Tenebrio molitor* and *Tenebrio obscurus*.

Other references to beetles will be found in Midsummer Night's Dream, Act III., sc. 1; Taming of the Shrew, Act IV., sc. 1; Antony and Cleopatra, Act III., sc. 2; and Cymbeline, Act III., sc. 3.

Hemiptera.—In the Merry Wives of Windsor, Act I., sc. 1, is an amusing play upon the word "luce." Slender exalting Robert Shallow, "Justice of the Peace and *coram*," and "*cust-alorum*," and "*ratolorum*," and "*armigero*," says:

> All his successors, gone before him, have done 't; and all his ancestors that come after him, may; they may give the dozen white luces in their coat.

To which Sir Hugh Evans, the Welsh chaplain replies:

> The dozen white louses do become an old coat well, it agrees well passant; it is a familiar beast to man, and signifies—love.

The passage shews that Shakespeare had not forgotten his early escapade, and angry slur upon Sir Thomas Lucy of Charlecote:

> If lousy is lucy, as some folks miscall it,
> Then Lucy is lousy whatever befall it.

The "luce" is, of course, the fleur-de-lis, or flower-de-luce, and the "coat," Robert Shallow's coat of arms. In the association of the "familiar beast," with "love," we are reminded of the "lousy and lecherous" of one of our modern ballad-writers.

Shakespeare makes at least eight allusions to the louse. One of them conveys the strongest expression of contempt that can possibly be imagined: "I care not to be the louse of a lazar." (*i. e.* of a man afflicted with loathsome diseases). Troilus and Cressida, Act V., sc. 1.

ORTHOPTERA.—"Shall we be merry?" asks Prince Henry in 1st Part of K. Henry IV., Act II., sc. 4. "As merry as crickets," answers Poins. The cheerful note of the cricket (*Acheta domestica*), produced by the rubbing together of the notched edges of the insect's upper wings, must have been a familiar sound to Shakespeare. When all is quiet around the hearth the note arises in many an English dwelling. But a very slight noise will startle the insect, and cause a cessation of its music. So the little Mamillius in a Winter's Tale, says that he will tell his story *so softly*, that "yon crickets shall not hear it," Act II., sc. 1.

Amongst the equipments of Queen Mab is a "whip of cricket bone." Romeo and Juliet, Act I., sc. 4. The "winter cricket" is spoken of in the Taming of the Shrew, Act IV., sc. 3.

I find but one allusion to locusts—that made by Iago when speaking of Othello and his countrymen.

> These Moors are changeable in their wills:—fill thy purse with money; the food that to him now is as luscious as locusts, shall be to him shortly as bitter as coloquintida.—Othello, Act I, sc. 3.

The species mentioned here is doubtless *Œdipoda migratorius*, which often visits Morocco, and is used for food.

The grasshopper is mentioned in Romeo and Juliet Act I., sc. 4, where the cover of Queen Mab's wagon is said to be made of the wings of grasshoppers.

ARACHNIDA.—In the Merchant of Venice we have an instance of the skill with which the great poet could draw, even from the work of a disgusting insect, a fitting illustration to enhance the attractions of an admired lady.

> ——— Here, in her hair,
> The painter plays the spider, and hath woven
> A golden mesh, to entrap the hearts of men,
> Faster than gnats in cobwebs.
> Act III., sc. 2.

A different kind of weaving is spoken of in the 2nd Part of K. Henry VI., Act III., sc. 1:

> My brain more busy than the labouring spider
> Weaves tedious snares to trap mine enemies.

And in Othello, Act II., sc. 1, where Iago says to himself,

> With as little a web as this
> Will I ensnare as great a fly as Cassio.

And yet again in K. Henry VIII, Act I., sc. 1, where it is said of Wolsey:

> ——— Spider-like
> Out of his self-drawing web, he gives us note
> The force of his own merit makes his way.

With wonderful effect Shakespeare makes use of the Spider in shewing the power of imagination.

> There may be in the cup
> A spider steep'd, and one may drink, depart,
> And yet partake no venom; for his knowledge
> Is not infected: but if one present
> The abhorr'd ingredient to his eye, make known
> How he hath drank, he cracks his gorge, his sides,
> With violent hefts:—I have drunk and seen the spider.
> Winter's Tale, Act II., sc. 1.

In Troilus and Cressida, Act V., sc. 2, is a reference to Arachne. Arachne, according to the ancients, was the daughter of Idmon, a Lydian. She was a skilful spinner, and contended with Pallas. Defeated and chagrined, she hanged herself, and was turned into a spider.

In King John, Act IV., sc. 3, Hubert suspected of murdering Prince Arthur, is told that

> The smallest thread,
> That ever spider twisted from her womb,
> Will serve to strangle thee.

Other passages referring to spiders may be found in Midsummer Night's Dream, Act II., sc. 3; King Richard II., Act III., sc. 2; King Richard III., Act I., sc. 2, and Act II., sc. 4; Cymbeline, Act IV., sc. 2; King Lear, Act IV., sc. 6; Romeo and Juliet, Act I. sc. 4, and Act II., sc. 6.

Scorpions are spoken of in Macbeth, Act III., sc. 4; 2nd Part of K. Henry VI., Act III., sc. 2; and Cymbeline, Act V., sc. 5.

It is evident that Shakespeare, in his walks around Stratford and on the pleasant banks of Avon, had found food for reflection in the appearances and habits of the commoner insect tribes. His were the observing eye and the contemplative mind; and with marvellous power he turned the knowledge of insect-life that he acquired to account, for the instruction and amusement of the men of his own day, and of after generations. He was one who could find

> Tongues in trees, books in the running brooks,
> Sermons in stones, and good in everything.

And we are happy in that he has, in so many instances, interpreted these tongues, translated these books, written down the sermons and pointed out the good for us.

ENEMIES OF THE GRAIN APHIS.—Prof. H. Garman, Entomologist and Botanist of the Kentucky Agricultural Experiment Station, in a paper on the grain louse (Siphonophora avenæ) has the following to say about its natural enemies:

The helplessness of plant lice makes them the prey of many predaceous and parasitic insects. A visit to infested wheat fields in June showed great numbers of these present among the lice. Undoubtedly the injury to grain was very much lessened by the work of these friends of ours, yet, as we have shown, lice still exist in the fields, and they are liable again to assume destructive numbers.

Chief among the enemies of the grain louse are certain small, dark-coloured, four-winged flies, which belong to the same order as the common honey bee. These little flies deposit their eggs in the bodies of the plant lice, placing a single egg in each louse, and from the eggs come small grubs which live in the interior of their host, finally emerging after its death as egg-laying flies. Grain lice infested with these grubs become swollen, assume a brown colour, and by some means are fastened to the plants, where they remain as empty skins after the parasite emerges.

Small two-winged flies, about five-sixteenths of an inch long, with brassy brown thorax, and with the abdomen striped crosswise with black and yellow, also do good service in destroying the lice. They scatter their eggs among the colonies, and from these hatch greenish larvæ, which destroy the lice by seizing them and sucking their juices.

The lady bugs in both larval and adult stages devour the lice bodily. Several species of these beetles were common in the fields, but the most conspicuous from size and abundance, was the nine-spotted lady bug (*Coccinella 9-notata*). It may be recognized by the arrangement of the nine black spots on the brown wing covers—four on each side, the ninth just behind the thorax and overlying the middle line. It is very nearly a half sphere in shape. The other species are like it in general shape, but differ in details of colour and markings. A small list of other insects which do more or less good in destroying the aphides could be given, but this will suffice to give an idea of the more abundant and useful of our insect friends.

Birds have been thought to destroy the lice, but I have seen no evidence of their doing so. Most birds depend on larger insects, and it is only occasionally that the small species, such as warblers, eat plant lice of any kind. Excepting the Maryland yellow–throat, birds of this family rarely occur in our grain fields, so that we can hope nothing from their help. The English sparrow, with its clumsy beak and grain-eating propensity, certainly does no good in this direction.

EXPERIMENTS WITH ARSENITES.—In the Bulletin of the Iowa Agricultural Experiment Station for August, 1890, Prof. Gillette gives an elaborate and interesting account of a series of experiments that he carried out for the purpose of testing the use of arsenites in the warfare against noxious insects.

"Paris green, he says, was brought into prominence as an insecticide for the first time in this country in 1869, and London purple in 1877. Arsenious acid (white arsenic) was successfully used for the destruction of the Canker-worm as early as 1875 and is still frequently recommended for the destruction of insects. During these years the arsenites have arisen to the first rank as insect destroyers. They have been largely experimented with by entomologists and widely used by farmers and fruit-growers, and yet there is much difference of opinion as to the proportions in which each may by safely applied to different plants for the destruction of insects. In fact a serious obstacle in the way of a more free and successful use of the arsenites has been their liability to injure tender foliage, even when applied very dilute. In the experiments of the past two seasons, herein reported, I have given much attention to the finding of some method of applying these poisons so as to prevent injury to foliage without lessening their effectiveness in destroying insect life, and the success met with in this direction has been most gratifying. I also give the results of experiments to determine relative injuries to foliage from applications of the arsenites when freshly mixed and when allowed to stand a few days before being applied; to show the effect upon foliage by adding paste or soap to arsenical mixtures; to show the effects of sun, dew and rain upon foliage treated with arsenical mixtures; to show whether or not it is practical and safe, so far as injury to the plant is concerned, to mix the arsenites with insecticides that kill by external contact; and to show the effects of combining the arsenites with fungicides."

After giving a detailed account of his various experiments, he arrives at the following conclusions:—

"*1. The oldest leaves are most susceptible to injury from arsenical applications. They often turn yellow and drop without showing the burnt spotted appearance.*[*]

2. Dews, and probably direct sunlight, increase the injuries done by the arsenites to foliage.

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[*] I have put in italics those conclusions that seem to me to be well proven from the experiments here reported. Concerning the others there is some doubt, and further experiments are necessary to determine positively the facts.

3. Leaves kept perfectly dry can hardly be injured by the arsenites, even when they are applied very abundantly.

4. Applications made in the heat of the day and in the bright sunlight do not injure foliage more than when applied in the cool of the day.

5. The only effect of a heavy rain or dashing shower following an application of one of the arsenites is to lessen the injury to foliage.

6. Leaves suffering from a fungous disease are more susceptible to injury than are healthy leaves.

7. When freshly mixed and applied, London purple is most and white arsenic is least injurious to foliage.

8. White arsenic in solution should not be used upon foliage without first adding lime, Bordeaux mixture or some other substance to prevent its injurious effects upon foliage.

9. White arsenic, if ollowed to stand many days in water before being applied, will do far greater harm to foliage than if applied as soon as mixed

10. Lime added to London purple or Paris green in water greatly lessens the injury that these poisons would otherwise do to foliage.

11. Lime added to a mixture of white arsenic in water will greatly increase the injury that this poison would otherwise do to foliage. If the arsenic is all in solution, the lime witl then lessen the injury, as in the case of London purple or Paris green.

12. London purple (Paris green and white arsenic have not yet been tried) can be used. at least, eight or ten times as strong without injury to foliage if applied in common Bordeaux mixture instead of water.

13. The arsenites cannot by any ordinary method be successfully mixed in a kerosene emulsion.

14. The arsenites mix readily in resin compounds and do not seem to be more injurious to foliage than as ordinarily applied in water.

15. The arsenites in strong soapy mixtures do considerably more damage to foliage than when applied in water only.

16. The arsenites mix readily in carbonate of copper solution and do not seem to do more harm than when applied in water only.

17. London purple in sulphate of copper solution does vastly more harm than when applied in water only.

HONEY BEES AND ARSENICALS USED AS SPRAYS.—Mr. H. O. Kruschke, of Juneau county, Wisconsin, in the *American Garden* for January, 1890, p. 57, warns prospective sprayers that the first man caught applying arsenic to trees in full bloom will be prosecuted—reasoning that the spraying of such trees will result in the storage by the bees of poisoned honey, the consumption of which will be dangerous.

In our Report for last year, (1889, page 87) we quoted from *Insect Life* an account from Prof. Webster of the spraying of fruit trees without any ill results to either bees or honey. "The prevailing belief," says *Insect Life*, "is, however, the other way, and cases are on record where serious destruction of bees has resulted from spraying. In the case of the apple, particularly, the application should not be made until the bloom has begun to fall, when no injury will be likely to result. It was because of the possibility of danger that in the beginning we were very slow to recommend the wholesale spraying of orchards with the arsenical mixtures, but experience has shown here, as in other cases, judicious and cautious use is attended only with benefit, and that the possible harm is reduced to such a minimum as to almost justify its being left out of consideration."

ANT HILLS AND SLUGS.—I have resorted to many expedients to get rid of the ant hills that disfigure my lawn and sometimes seriously injure plants and shrubs, and have finally succeeded in conquering them. I first hive them,—break up the nest pretty thoroughly and if it is near the roots of a plant draw as much of the débris as possible a little way from it and turn over it a large plant jar. The ants will promptly appropriate the jar, remove their larvæ to it, and fill it with pellets of earth. I then drench this with kerosene emulsion reduced to a strength of 2 to 3 per cent., which will kill every ant thoroughly drenched with it. It is more destructive to them than pure kerosene, which does not adhere to them. In this way I have thoroughly conquered the ants.

The rose slug and the currant worm I keep completely under by use of hellebore, a tablespoonful to a gallon of water, and forcing it violently among the foliage with a hydropult. Commencing in the spring before I can find a slug or a worm, and repeating the drenching once a week for three or four weeks, I can destroy them completely before they do any damage. On one hundred roses I was able this spring to find only two slugs, while the foliage of some common sorts I did not spray was completely destroyed.—[M. C. Read, Hudson, Ohio, n *Insect Life.*

GOOD INSECTIVOROUS BIRDS.—The following birds are to be classed among the most helpful kinds in the general warfare against insects: Robins, for cut and other earth worms. Swallows, night-hawks and purple martins, for moth catchers. Pewees, for striped cucumber bugs. Wood thrushes and wrens, for cut worms. Cat birds, for tent caterpillars. Meadow larks, crows and woodpeckers, for wireworms. Blue-throated buntings, for canker worms. Black, red-winged birds, jays, pigeons, doves, and chippies—strawberry pests. Quail, for chinch bugs and locusts. Whip-poor-wills, for moths. Hawks, all night birds, owls, tanagers, black-winged summer red birds, etc.—curculios. There may also be mentioned the following insect pest destroyers: Indigo birds, nut crackers, fly catchers, chimney swifts, chipping and song sparrows, black birds, mocking birds and orioles.

There is little doubt that for every bird which is injurious to fruit that is killed, there are a hundred killed that are beneficial. Of course the whole life of the bird must be considered, for very many are fruit eaters The only question is, does the bird, on the whole, do most damage or good?

The man who indiscriminately kills the birds in his orchard and berry patch is not fit to live, and he will surely lose more than he will gain even from a financial point of view.—*Prairie Farmer.*

RESISTANCE TO COLD BY A CATERPILLAR.—Mr. Otto Dugger, St. Anthony Park, Minn., gives in *Insect Life* the following instance of resistance to extreme cold by a caterpillar of the Dusky Spilosoma (*S. fuliginosa*, Linn) :—" December 3, 1889. Found to-day in a little depression of the soil a clear cake of ice, and imbedded in it the larva of the above species. By means of a hot iron I separated a cube of ice with the inclosed larva, and took it to my office. The caterpillar was entirely and solidly inclosed by the ice; no air-spaces could be detected among the hair. How long the caterpillar had been inclosed I could not say. Left the cube of ice in front of my window, where the temperature sunk for two days to 11° below zero. Later the weather moderated, and during the day a little ice would melt near the caterpillar, but never exposing it to the air. After being inclosed for fourteen days, I carefully melted the ice and removed the caterpillar to a piece of blotting paper. In less than thirty minutes the larva was crawling about, not injured in the least. Yet, to escape further experimentation, it has shown good sense and spun up, and transformed into a pupa, healthy to all appearances."

SAW-FLY BORER IN WHEAT.—Prof. J. H. Comstock, Entomologist, Cornell University, Ithaca, N. Y., describes a new saw-fly working in wheat, known as Cephus pygmæus, order Hymenoptera, of the family Tenthredinidae as follows

An insect destructive to wheat, but previously unknown in this country, has appeared in considerable numbers on the Cornell University farm. I do not know of its occurrence anywhere else in this State ; but as it is extremely abundant here, it is doubtless spread over a considerable area. It was first observed in this locality two years ago by one of our students, the late Mr. S. H. Crossman while making an investigation of wheat insects. Mr. Crossman's studies, however, were sadly terminated before he had carried his investigations of this species very far; and it has fallen to me to continue the work begun by him.

On examining the stalks of wheat at harvest time by splitting them throughout their length, it was found that some of them had been tunnelled by an insect larva. This larva had eaten a passage through each of the joints so that it could pass freely from one end of the cavity of the straw to the other. In addition to tunnelling the joints they had also fed more or less on the inner surface of the straw between the joints; and, scattered throughout the entire length of the cavity of the straw, except the smaller part near the head, were to be seen yellowish particles, the excrement of the insect.

If infested straws be examined a week or ten days before the ripening of the wheat, the cause of this injury can be found at work within them. It is at that time a yellowish, milky-white worm, varying in size from 1-5 inch (5 mm.) to ½ inch (12 mm.) in length. The smaller ones may not have bored through a single joint; while the larger ones will have tunnelled all of them, except, perhaps, the one next to the ground.

As the grain becomes ripe the larva works its way towards the ground, and at the time of the harvest the greater number of them have penetrated to the root. Here in the lowest part of the cavity of the straw they make preparations for passing the winter, and even for their escape from the straw the following year. This last is done by cutting the straw circularly on the inside, nearly severing it a short distance, varying from one-half inch to one inch from the ground. If the wheat were growing wild, the winter winds would cause the stalk to break off at this point, and thus the insect after it had reached the adult stage in the following year could easily escape; while but for this cut, it would be very liable to be imprisoned within the straw. But under ordinary circumstances the straw is cut by the reaper before it is broken off at this point, and consequently that breaking off does not occur. If, however, there is a strong wind just before the harvest and after the straws have been cut in this manner by the insects, they are very liable to break off; the lodging of the grain may, therefore, be largely due to the injuries of this insect. In one field just before the harvest I observed a large number of isolated straws lying in a horizontal position; there was not the general breaking down of the grain characteristic of wind and rain; but distributed through the grain that was standing there was a large number of isolated straws that were lodged. A careful examination showed that this breaking down of the grain, in 45 per cent. of the cases, was directly due to the injuries of this insect. In many cases the straws had been broken off a considerable distance above the ground, and before the larva had made the characteristic circular cut near the root. An examination of these straws showed that the larva had eaten all, or nearly all, of the softer inner part of the straw for a short distance, thus making a weak place which was easily broken. As a rule, however, the larva obtains a greater part of its nourishment by tunnelling the joints of the straw and does not eat enough of the straw in any place to cause it to break until it makes the circular cut near the ground described above.

After the circular cut has been made, the larva fills the cavity of the straw just below it for a short distance with a plug of borings. Between this plug and the lower end of the cavity of the straw there is a place measuring about one-half inch in length (10 mm. to 15 mm.) It is here that the insect passes the winter. Immediately after cutting the straw and making this plug the larva makes a cocoon by lining the walls of this space with a layer of silk. This layer is thin but very firm and more or less parchment-like; it can, however, be broken with slight difficulty, being somewhat brittle.

Within this cocoon, which remains in the stubble after the grain is cut, the insect passes the winter, in the larval state. It changes to a pupa during March or April; and sometime during the month of May the adult insect appears.

The exact date of the appearance of the insect depends upon the nature of the weather. This year from pupæ collected on the 23rd of April and brought into the Insectary, the adults emerged from the 8th to the 10th of May; while the insects left in the fields were ten days later in emerging.

The adult insect is a four-winged fly belonging to the order *Hymenoptera*, the order that includes the bees, wasps and ants; and it is a member of the family *Tenthredinidae* of this order, a family comprising the insects commonly known as saw-flies. This popular name refers to the fact that in this family the female insects are furnished with a more or less saw-like organ. This arises near the caudal end of the body, and is the ovipositor. By means of it the insects are able to make incisions in the tissues of plants for the reception of their eggs.

In the *Canadian Entomologist*, 1890, p. 40, Mr. Harrington records the occurrence of this insect at Ottawa, Ont., and also at Buffalo, N. Y.

The Habits of a Ground-Hornet.—*Stizus speciosus* is the largest native ground-hornet, and its formidable appearance and great activity generally secure it undisputed possession of the square rod where it happens to alight. It is from an inch to an inch and one half in length; the head and thorax are brown and the abdomen is black with six irregular yellow blotches. These markings are discernible as it flies swiftly about its business and give it a particularly tiger like appearance. It seems to be afraid of nothing, and if you walk near its burrow it flies with a menacing buzz in circles about you, and its brown, black and yellow body gleams in the sunlight.

In constructing its burrows it usually selects a country road side or a dry barren hill, where a freedom from roots makes digging less laborious.

On the hill back of Richmond village, on Staten Island, I have seen them carrying heavy harvest flies to these burrows, several of which are dug there nearly every summer. The task of carrying so great a burden as a Cicada is a particularly laborious one, and they do not fly very fast when thus heavily laden. Sometimes they drag the harvest-flies a distance along the ground, and sometimes they resort to an ingenious method to finally get them to their burrows.

In August, 1889, I observed a Stizus carrying a Cicada and flying slowly up a hill side. It lit at the base of a black birch on the hill top, and dragged the harvest-fly, holding the smooth dorsal surface to the bark, to the topmost branches finally disappearing among the leaves. I did not see it leave the tree, for I was unable to command a view on all sides at the same time, and then there was a neighboring birch whose branches interlocked with the one where the hornet was. I satisfied myself that it did leave, by climbing up and violently shaking the branches and tree top, Stizus employs this method of transporting the heavy Cicada ; it climbs the tree with the insect, and then flies from the branches, the excessive weight gradually bringing it to the ground again but nearer to its burrow.

Professor Morse, in his annual address before the American Association in 1887, notices the following:—Dr. Thomas Meehan describes a hornet that was gifted with great intelligence. He saw this insect struggling with a large locust in unsuccessful attempts to fly away with it. After several fruitless efforts to fly up from the ground with his victim, he finally dragged it fully thirty feet to a tree, to the top of which he laboriously ascended, still clinging to his burden, and having attained this elevated position he flew off in a horizontal direction with the locust."

Commenting upon this, Mr. C. G. Rockwood, jr., in Science for August 19th, 1887, gives an account of a large insect evidently of the wasp family, that carried a Cicada for a distance of twenty feet up a maple tree and then flew away with it as described above.

Wishing to ascertain the relative weights of these insects, I had dried specimens, including pins, weighed in a druggist's scales. *Cicada tibicen* weighed thirteen grains and *Stizus speciosus* seven and one half.—W. T. Davis, Tompkinsville, Staten Island, N. Y.

EXPERIMENTS FOR THE DESTRUCTION OF CHINCH BUGS.

BY PROF. F. H. SNOW, UNIVERSITY OF KANSAS, LAWRENCE.

These experiments have been continued through the two seasons of 1889 and 1890 and have been remarkably successful. As entomologist to the Kansas State Board of Agriculture I had prepared an article for the annual meeting of that Board in January, 1889, stating what was known at that time upon the subject, and calling attention to the investigations of Professors Forbes, Burrill and Lugger. In June, 1889, a letter was received from Dr. J. T Curtiss, of Dwight, Morris County, Kansas, announcing that one of the diseases mentioned in the article (Entomophthora) was raging in various fields in that region, and stating that in many places in fields of oats and wheat the ground was fairly white with the dead bugs. Some of these dead bugs were at once obtained and experiments were begun in the entomological laboratory of the University. It was found that living healthy bugs, when placed in the same jar with the dead bugs from Morris County, were sickened and killed within ten days. A Lawrence newspaper reporter learning of this fact published the statement that any farmers who were troubled by chinch-bugs might easily destroy them from their entire farms by sending to me for some diseased bugs. This announcement was published all over the country, and in a few days I received applications from Agricultural Experiment Stations and farmers in nine different States, praying for a few " diseased and deceased " bugs with which to inoculate the destroying pests with a fatal disease. Some fifty packages were sent out during the season of 1889, and the results were in the main highly favorable. It was my belief that sick bugs would prove more serviceable in the dissemination of disease than dead bugs. I accordingly sent out a circular letter with each package, instructing the receiver to place the dead bugs in a jar for 48 hours, with from ten to twenty times as many live bugs from the field. In this way the disease would be communicated to the live bugs in the jar. These sick bugs being deposited in different portions of the field of experiment would communicate the disease more thoroughly while moving about among the healthy bugs by which they would be surrounded. This belief was corroborated by the results. This disease was successfully introduced from my laboratory into the States of Missouri, Nebraska, Indiana, Ohio and Minnesota, and into various counties of the State of Kansas. A report of my observations and experiments in 1889 has been published in the transactions of the Kansas Academy of Science, vol. XII., pp. 34-37, also in the report of the proceedings of the Annual Meeting of the Kansas State Board of Agriculture in January, 1890.

The next point to be attained was the preservation of the disease through the winter, in order that it might be under my control and be available for use in the season of 1890. To accomplish this result, I placed fresh healthy bugs in the infection jar late in November 1889, and was pleased to note that they contracted disease and died in the same way as in the earlier part of the season. I was not able to obtain fresh material for the purpose of testing the vitality of the disease germs in the spring of 1890, until the month of April, and then only a limited supply of live bugs could be secured. I quote the following from my laboratory notes :

April 10 : twenty-five chinch-bugs that had hibernated in the field were put in the infection jars. They were supplied with young wheat plants. The bugs appeared lively and healthy.

April 16 : some of the bugs were dead and all appeared stupid.

April 20 : all of the bugs were dead.

One week later, a new supply of fourteen bugs was put into the jar ; they were supplied with growing wheat. They ran substantially the same course as the first twenty-five. Some had died at the end of the first week and all were dead by the end of the thirteenth day.

The chinch-bug seemed to have been very generally exterminated in Kansas in 1889, and only three applications for diseased bugs were received in 1890 up to the middle of July. On account of the limited amount of infection material on hand, I required each applicant to send me a box of live bugs, which I placed in the infection jars, returning in a few days a portion of the sick bugs to the sender. The three applicants above noted reported the complete success of the experiments. I give the following letter from Mr. M. F. Mattocks, of Wauneta, Chautauqua County, Kansas :

Wauneta, Kansas, July 7, 1890.

Dear Sir :—I received from you a few days since, a box of diseased chinch-bugs. I treated them according to instructions, and I have watched them closely, and find that they have conveyed the disease almost all over my farm, and bugs are dying at a rapid rate. I have not found any dead bugs on farms adjoining me. I here enclose you a box of healthy bugs that I gathered 1½ miles from my place ; I do not think they are diseased. Yours, M. F. Mattocks.

I also quote the following clipping from the Cedar Vale (Chautauqua Co.) *Star:*

Infecting Chinch-Bugs.—There is no longer any need of having our crops destroyed by chinch-bugs. A remedy that is sure as death and costs nothing, has been discovered and is used in this country with complete success. Mr. M.F. Mattocks, living a mile and a half east of Wauneta, on the H. P. Moser farm, is entitled to the credit of demonstrating in this part, the efficiency of the remedy. He was about to lose his corn crop by the bugs that were swarming into it from the stubble. He sent to Chancellor F. H. Snow, of the State University at Lawrence, and from him received a box containing a half-dozen diseased bugs. With them he exterminated a forty acre field full of the pests. They have died by the millions, in fact, they have about all died from the infection of those six bugs. A little circular of instructions, which he followed out, came with them. The six bugs were placed in a bottle with three or four hundred from the field, and were left together thirty-six hours and then turned loose, both the living ones and the dead, in the field. Devastation followed, and Mr. Mattocks will be troubled no more with chinch-bugs this year. If your crop is in danger you can save it by the same means of getting the diseased bugs in your field. It will cost you nothing and is a dead sure remedy. He has been sending dead and infected bugs to others in the country and to Prof. Snow, whose supply was running down.

I personally visited Mr. Mattocks's farm and verified the above statements.

The difficulty of obtaining enough live bugs to experiment with in the laboratory led to the sending out of the following advertisement, which was sent out to twenty prominent papers with requests for its publication:

WANTED! CHINCH-BUGS!

Prof. F. H. Snow, of the University of Kansas, is in great need of some live and healthy chinch-bugs with which to carry on his experiments in chinch-bug infection. Anyone who will send a small lot of bugs to Prof. Snow, University of Kansas, Lawrence, Kansas, will confer a favor on the investigator, and, it is hoped, on the farmers of Kansas.

This request for live bugs was given wide circulation and resulted in keeping the laboratory fairly well supplied with material for experiment.

Before the close of the season of 1890, it became evident that there were at least three diseases at work in our infection jars, the "white fungus" (Entomophthora or Empusa), a bacterial disease (Micrococcus), and a fungus considered by Dr. Roland Thaxter to be *Isaria* or perhaps more properly *Trichoderma.*

The following report which describes the bugs as "collecting in clusters" points to the bacterial disease as the cause of destruction:

Piqua, Woodson Co., Kansas, 7th December, 1890.

Dear Sir.—Since writing you from Humboldt, Ks., the 6th inst., I have made the happy discovery that the germs of contagious diseases sent me were vital. On Sunday last upon examination of the millet field I found millions of dead bugs. They were collected in clusters. My idea is that dampness facilitates the spread of the contagion. The first distribution of diseased bugs two days after I received the package by mail apparently produced no results. A part of them were retained in the infection jar (quart Mason fruit jar); half a pint of bugs were collected from the field; three days later a foul stench was found to emanate from the jar, and a part of the bugs in it were dead. On July 3rd I took advantage of the cool damp evening and took a few buckets of cold water and sprinkled the edge of the millet and distributed more infected bugs. On the 6th I found millions of dead bugs. I think the night and sprinkling the millet caused the disease to spread. We have had no rain in this neighborhood since June 17th, if I remember correctly. The depredations of chinch-bugs are always more serious in dry, hot weather. You have conferred a lasting benefit on the farming interests of the United States, the value of which cannot be estimated in dollars and cents. It was estimated that during one of the visitation years of this insect the damage in the Mississippi valley amounted to ten millions of dollars. I have no doubt that by a proper manipulation of the contagious disease in the hands of intelligent persons it will prove an effective remedy. I think the contagion should be introduced among them early to prevent the migration of the young brood. In my case I received it too late. Early sown millet presents a favorable place to infect the bugs, as they seem to collect in the shade and die. Hoping that when the next Legislature meets an appreciative public will suitably reward you for your beneficient discovery, I am gratefully yours,
W. G. McCormick.

The field experiments were apparently equally successful in the months of July, August and September. The following August field-report is inserted as a fair sample of the manner in which the farmers themselves regard these experiments:

Florence, Marion Co., Kansas, November 1st, 1890

Dear Sir.—On the 20th of August (I think it was) I wrote to you to send me some infected chinch bugs, and on the 30th of the same month you sent me a small lot of infected bugs, I suppose about thirty in all. I then put with these about twenty times as many healthy ones and kept them forty-eight hours, and then deposited them in and through my field—I have about 55 acres under cultivation.

At the time I wrote for bugs my place was all in corn and a very large crop of chinch bugs. I am safe in saying that there were more bugs on my farm than on any two farms with the same amount of land under cultivation. At the time of sending to you for bugs I told two of my neighbors of my intention, and they laughed at the idea, nevertheless I sent. When I put them in my field it had rained fully a half day, and after noon I commenced to place them about in different places in my field. I noticed no change in the bugs for three days, it being cold. On the fourth and fifth days the weather was more warm, and it was then that the destruction of the enemy commenced with great satistaction to myself and great surprise to mylaughing neighbors. One of my neighbors, Mr. George Winchester, said that there ought to be a subscription raised and donated to me. I told him not to me but to you the praise belonged. I think that it took about eight days after the five from the time that I placed them in my field before they were all destroyed. The fifth day after I put out the diseased bugs I noticed that a great many bugs were flying away from my place. I cannot say if the disease spread in this way or not, or if it spread at all. Three or four persons said they would come and procure of me some of the dead bugs, but no one came. This much I can say, with me this experiment has been a complete success. It has done me a great deal of good. I cannot give it a money value, but am satisfied that had it not been for the infected bugs obtained of you that I would have lost twenty-seven acres of wheat and eight acres of rye, and when I wrote to you for bugs I then contemplated putting out considerable wheat, and I was at that time considerably troubled about the bugs in my corn, thinking that if I put out any wheat at all it would be destroyed by bugs; but thanks to you my wheat is now safe from bugs, at least those that were on my place before sowing my wheat. I only wish that I had written to you sooner than this. I will send by express one bottle of bugs that I gathered after they commenced to die. Respectfully yours, JOHN KNOBLE.

The following report from R. L. Stangaard is inserted as being of a more scientifically circumstantial character than most of the other reports:

FLORENCE, Kan., Aug. 22nd, 1890.

DEAR SIR.—In reply to your favor of July 27th, I would say that infected bugs were applied, after they were kept with live ones about forty-two hours. Most of the bugs mixed were dead when taken out of the box. They were applied in seven different hills, being put into every ninth hill. I marked every hill with a number so as to be better able to watch the progress. Examined after forty-eight hours application with the following results:—No. 1, mostly dead. No. 2, bugs mostly alive, seemingly very restless. No. 3, bugs seem to be sick. No. 4 bugs mostly dead. On hills around this one bugs seem to be restless. No. 5, not examined. On hills around it the bugs seem to be sick. Examination eight days after application with the following results:—No. 3, bugs seemingly in a dying condition. On the hills around it the bugs seem to be well with exception of one hill where they seem to be dying and some dead. No. 4, not a live bug in the hill. No. 5, apparently dying, also dying in the hills around this. No. 6, bugs dying in hill. No. 7, apparently not dying. On August 16th, twelve days after application, I found the bugs to be dying and dead all through the field—twelve acres. On August 20th, I again found the bugs to be dying rapidly. A field being forty rods distant had sure marks of bugs in a dying condition. What I mean by bugs being in a dying condition is this: they lay on their backs, almost motionless, and others lay in same position, moving limbs violently. This remedy was applied on A. G. Rosiere's farm on Bruno creek, Marion Co., Kansas, being nine miles east and three miles south of Marion. Thanking you for your avors, I remain, yours truly, R. L. STANGAARD.

The laboratory experiments have been continued through the season. Of the three diseases identified, that produced by the Trichoderma appears to be less fatal than the other two, as is indicated by the following laboratory notes:

September 28th, dead chinch-bugs showing no signs of fungus externally were taken from the infection jars and crushed on a glass slide in distilled water. Oval hyphal bodies of a fungus (Trichoderma) were found in considerable number. These were put under a bell jar.

September 29th, some of the hyphal bodies had put out slender mycelial growths; others in immense numbers were multiplying by division.

October 1st, the hyphal bodies were still multiplying by division. The mycelial growths had become much longer and in some instances had variously branched.

October 3rd, a dead chinch-bug taken from an infected field was crushed on a glass slide in distilled water. Both round and oval hyphal bodies were found in considerable numbers. The sewere put under a bell jar to prevent dying.

October 4th, both round and oval hyphal bodies were multiplying by division and were putting out mycelial growths.

October 5th, fresh chinch-bugs from an uninfected field were immersed in the liquid containing the above fungi and were put in a new jar with young corn plants.

October 16th, many of the bugs were dead; the others apparently lively. The dead bugs were found to contain hyphal bodies similar to those with which they were infected. A live chinch-bug from the same jar was crushed and found to contain round hyphal bodies; but these refused to germinate.

November 5th, not all of the bugs are yet dead. The few remaining are apparently lively.

The following is a summary of the results of the field experiments in the season of 1890:

Number of boxes of diseased bugs sent out, 38. Seven of these lots were either not received, or received and not used. Reports were received from 26 of the 31 remaining cases. Of these 26 reports, 3 were unfavorable, 19 favorable, and 4 doubtful, concerning the success of the experiment. These doubtful cases are not to be looked upon as unfavorable, but more evidence is needed to transfer them to the list of favorable reports. These 19 out of 26 reports, or 73 per cent., were decidedly favorable. The experiments will be continued during the season of 1891.

In presenting this paper I wish to acknowledge the invaluable aid continually received during the progress of the work from my assistants, Messrs. W. C. Stevens and V. L. Kellogg.

BOOK NOTICES.

BUTTERFLIES OF NORTH AMERICA. Third Series—Part X. By W. H. Edwards.

The last part of Mr. Edwards's superb work has just come to hand. It is of exceptional beauty and interest. Special attention has been lately called to the American species of the genus Argynnis, by the publication of Mr. H. J. Elwes's "Revision of the genus Argynnis." (Trans. Ent. Soc. Lond. 1889. Part IV.) and Mr. Edwards's "Notes" thereon (Can. Ent. XII. p. 82.) The present number contains plates and descriptions of three species of this genus, the validity of two of which has been questioned by Mr. Elwes. Plate I. illustrates the complete life history of *A. Alcestis* by which it is shown that not only is it distinct in the imago state from both *Aphrodite* and *Cipris* but also in its preparatory stages.

Plate II. *Argynnis Adiante* (male and female). This is a local Californian species of which Mr. Elwes had only male specimens taken many years ago—from what material he had he was inclined to regard it as merely a variety of either *Zerene* or *Monticola*. It appears, however, that it is not such a rare species as he supposed, and Mr. Edwards had ample material to show that this species is valid. The male is figured from Dr. Boisduval's actual type. Dr. Behr, the well-known San Francisco lepidopterist, writes of it that it is common in its season at the proper locality, and further that unlike many Californian Argynnides it is very constant. On the same plate as *A. Adiante* is figured another interesting species *A. Atossa* (n. sp.) the male of which has been in Mr. Edwards's collection for twenty years; but the female was only discovered in 1889. From the figure it appears to be very distinct from anything we have in our fauna.

Plate III. shows *Satyrodes Canthus* in great detail. The text of this plate is very complete. Mr. Edwards has adopted Mr. Scudder's genus for this species but believes the name *Eurydice* does not belong to it.—J. F.

THE CAVE FAUNA OF NORTH AMERICA, with remarks on the Anatomy of the Brain and Origin of the Blind Species. By A. S. Packard, M.D. Vol. IV.: First Memoir—National Academy of Sciences. 4to., pp. 156.

The author of this admirable volume is everywhere known throughout the scientific world from his numerous works, especially on entomology, and has obtained a deservedly high reputation in Europe as well as in America. This reputation will, we are confident, be, if possible, enhanced by the elaborate monograph before us. It contains many original observations of cave animals, some careful scientific investigations, and a very interesting chapter of philosophic considerations. It is also fully illustrated by a map of the Mammoth Cave in Kentucky, a number of wood cuts and a series of twenty-seven beautiful lithographs, nearly all of them drawn by the author himself. The work begins with a description of the Mammoth Cave and others in the neighbourhood, and gives lists of the various animals found within them ; an account of the Wyandotte and other caves in Indiana, Clinton's Cave in Utah, and one in Colorado ; a discussion of the geological age of the caves and their inhabitants, the mode of colonization and the source of their food-supply. The second chapter describes the vegetable life of the caves, which is naturally of the most meagre description. Then follows a systematic description and list of the invertebrate animals found in North American caves, among which spiders are the most numerous. Insects are represented by eight species of Thysanura, four of Orthoptera, two of Platyptera, ten of Coleoptera and nine of Diptera—a by no means extensive list, but one that includes some very curious and interesting forms. The beetles of the genus *Anophthalmus* are especially remarkable and attractive to the ordinary entomologist. Lists are also given of the European and North American cave animals, and of the blind, eyeless creatures which do not live in caves, and which, strange to say, almost equal in number their cavernous relatives. The next chapter gives a careful account of the anatomy of the brain and eyes (when partly developed) of certain blind Arthropods. The chief interest of the work culminates in the final chapter where the author discusses the origin of the cave species as bearing upon the theory of evolution. We have not space for any abstract of his views, which are well-deserving of study, but must refer the reader who desires fresh evidence on the subject of evolution to the work itself. We entirely agree with the author in his closing words : " In the case of too many naturalists the dogma or creed of natural selection has tied their hands, obscured their vision, and prevented their seeking by observation and experiment to discover, so far as human intelligence can do so, the tangible, genuine, efficient factors of organic evolution."—C. J. S. B.

American Spiders and their Spinning Work. A natural history of the Orb-weaving Spiders of the United States, with special regard to their Industry and Habits. By Henry C. McCook, D.D. Vol. I. Published by the Author, Academy of Natural Sciences of Philadelphia, 1889. 4to., pp. 372.

The author of this sumptuous volume is so well known from his valuable and interesting works on the natural history of various kinds of ants, and his charming little book " The Tenants of an old Farm," that any productions of his pen are looked forward to with lively anticipation and keen interest. We are quite sure that no one of the subscribers to this, his latest and greatest work, has been in the least degree disappointed by this first volume of the promised three. Though spiders are not insects, we have no doubt that every entomologist, and indeed every lover of natural history in any of its departments, will deeply enjoy the perusal of this volume. We cannot give a better idea of its contents than by mentioning the subjects treated of. They are, first, the general classification, structure and spinning organs of spiders ; the construction and armature of Orbweavers' snares ; the characteristic forms and varieties of snares ; unbeaded orbs and spring snares ; the engineering and mechanical skill and intelligence of spiders ; their modes of procuring food and habits in feeding ; their fangs and poison bags ; their modes of nest making and its development in various tribes ; and finally the "genesis of snares." All these different subjects are fully illustrated with more than three hundred and fifty wood cuts. The second volume is to treat of the mating and maternal instincts, the life of the young, the distribution of species, etc. ; and the third will be devoted to descriptions of the orbweaving fauna of the United States, with coloured illustrations of a number of species. The whole will form one of the most complete works of the kind in the English language. Entomologists will need to have long purses if they wish to possess all the literature of the day, and to procure for themselves such costly and beautiful books as Scudder's and Edwards's Butterflies and McCook's Spiders. We trust that all who can possibly afford it will aid the authors in their self-sacrificing enterprises by subscribing for their books, but those who cannot do so should use their influence with their local Scientific Societies and Public Libraries and induce those in charge to purchase these valuable works for the general benefit. We are glad to say that the Public Library in Toronto and our Entomological Society have set a good example in this respect and rendered these works available for many of our readers.—C. J. S. B

REPORT ON INSECT AND FUNGUS PESTS. No. I. By Henry Tryon, Assistant Curator of the Queensland Museum. Published by the Department of Agriculture, Brisbane, Australia, 1889. 1 Vol., 8vo., pp. 238.

We have perused with great interest this first work that we have seen on the Economic Entomology of Australia. Some of the pests referred to are very familiar to us here, for instance, the Codling Moth and the Woolly Aphis of the apple tree, while others are species closely allied to those which are very destructive with us. The report takes up different fruits, vegetables and field crops that are most commonly cultivated in the colony, and describes the insects which especially attack them ; as far as possible the life history of each pest is given and remedies are suggested. The work is very carefully and thoroughly done, and will, no doubt, be of great value to the fruit growers and farmers in that part of the world. Its usefulness would of course be greatly enhanced by illustrations of the insects treated of, but evidently there were difficulties in the way of procuring these that could not at first be overcome. Future reports will doubtless be made popular in this way. The author deserves much credit for the valuable book he has produced. We trust that the Queensland Government will give him all the assistance and encouragement possible in the prosecution of his studies in practical entomology, and enable him to continue a work that is of the utmost economic importance.—C. J. S. B.

THE BUTTERFLIES OF INDIA, BURMAH AND CEYLON. By Lionel de Nicéville, Calcutta. Vol. 3. 12+503 pp. 6 pl. 1890. 8o.

Some three years or more ago, we noticed a work on the above subject by Marshall and de Nicéville, of which two volumes had been published, the last by de Nicéville alone. A third volume of over 500 compact pages has just come to hand, the most notable thing about which, at least to a dweller in temperate regions, is that it is wholly concerned with the Lycaenidæ, of which eighty-two genera and over four hundred species are described. Such wealth in these pigmies among butterflies is a striking fact. The author, however, beyond the generic collocation has made no attempt to classify this immense assemblage, contenting himself with only distinguishing certain groups of genera by the name of one of the included genera, as the "Thecla group," etc., which groups are characterised in a general but not formal way in the body of the work. These agree tolerably well with the groups Doherty had previously characterised from the egg alone, but are about twice as numerous and are established mainly upon the structural features of the imago. This is better than Distant's artificial divisions but there is plainly an open field here for investigation, and one which there is apparently no need for great delay in occupying, since (excepting the egg) the early stages of Lycaeninæ appear to offer less service to the systematist than in any other group of butterflies.

What will surprise one in this volume, is the very considerable addition to our knowledge of the early stages of the Lycaeninæ, for excepting the Hesperidæ this group is in general the least known of butterflies. Yet something is recorded of no less than thirty-four genera, much of it new, and in many a good deal of interesting history is related. This is a great improvement on the preceding volumes. One particular case, that of the pomegranate butterflies, whose history was briefly and partially given by Westwood, seems valuable enough to reprint for the benefit of American readers; and another, Curetis thetis, may well be mentioned here :—" The twelfth segment [of the larva] bears two most extraordinary structures, which consist of two diverging, cylindrical, rigid pillars, arising from the subdorsal region and of a pale green color. When the insect is touched or alarmed, from each pillar is everted a deep maroon tentacle as long as the rigid pillar, bearing at its end long parti-coloured hairs, the basal third of each hair being black, the upper two-thirds white. The maroon tentacle with its long hairs spread out like a circular fan or rosette is whirled round with great rapidity in a plane parallel to the body, its use being almost certainly to frighten away its enemies, as this larva, as far as I am aware, is not attended by protecting ants and lacks the honey-gland on the eleventh segment present in so many lycænid larvæ which are affected by ants."

Ants have been found attendant upon half a dozen genera, and in many cases they have been identified by Dr. A. Forel, of Switzerland. At least a dozen species are concerned, and they are about equally divided between the Formicidæ and Myrmicidæ.

Spalgis, it appears, is another instance of a carnivorous lycænid comparable to our Feniseca, the larva associating with and feeding upon the " mealy bug " of the planters, a species of Dactylopius. De Nicéville in no way favours Edwards's belief that Feniseca belongs to the Lemoniinæ, and adds nothing, as we had hoped he might be able to do, to Holland's suggestions that Liphyra, too, might be carnivorous, though he points out that the two genera differ in their perfect state in the number of subcostal nervules, and are therefore not so closely allied as Dr. Holland thought.

The seasonal dimorphism of many Indian Lycænidæ is well brought out, the dry and wet season taking the place of our spring and summer; indeed, it occurs in no less than eighteen genera, and this will be a revelation to many, and seems to bid fair to renovate the study of tropical butterflies. But while in India proper " the seasonal forms seem to be chiefly restricted to two, a wet and a dry," in the Himalayan district of Sikkim " the dry season form which occurs at the end of the year differs somewhat from the dry season form which occurs in the spring, so that with regard to some species there may be said to be three forms—a spring, a wet season, and a winter form." Sexual dimorphism on the contrary is very rare among tropical Lycænidæ, de Nicéville stating that he does not know positively of any case, though he suspects it in a species of Zephyrus. On the authority of Doherty (a native of Cincinnati by the way, working most industriously in the east), he credits half a dozen or more species as mimicking others of the same or neighboring groups of Lycænidæ. Much attention is also paid to the secondary sexual characteristics so far as their gross appearances are concerned, and they are noted in no less than nineteen genera.

Finally, we may call attention to the very interesting general chapter on the Lycænidæ at the beginning of the volume, which is of more than usual interest and rather exceptional in a work of this kind. The work itself must serve a very useful purpose; its execution is remarkably even and shows great skill and balance on the part of the author. There are half a dozen plates like those of the former volumes and executed by the same parties, excepting that two of them are chromo-lithographs, but we could wish that some plates of the early stages might have been added, and the direct purposes of the book for the Indian student would have been served by others giving structural details.—S. H. S.

MANUAL OF INJURIOUS INSECTS AND METHODS OF PREVENTION. By Eleanor A. Ormerod, Second Edition, 1890.

The enlarged and thoroughly revised edition of Miss Ormerod's Manual of Injurious Insects which has lately appeared, is a work of such importance to all engaged in agricultural pursuits, that it is thought well to place a notice of it in our Annual Report so that such of our readers who have not seen it may know of its publication. We feel confident that a perusal of this work would well repay all those engaged in the cultivation of farm, orchard or garden crops. The study of economic entomology has made great progress during the decade which has elapsed since the appearance of the first edition of Miss Ormerod's Manual in 1881, and this progress is to a large measure due to the unceasing labours of this talented lady. Her annual reports are eagerly looked for by thousands of farmers in Great Britain and by scientific students in all parts of the world. They give a concise account of the insect attacks which have occurred in the British Isles during the year which has followed the issue of the previous report. A feature of these reports is their practical nature, every attention being given to the best, not the largest number of, remedies for each insect mentioned. This character is also very manifest, as might have been expected, in this more important work of Miss Ormerod's. There is no writer upon the practical science of combating the ravages of insects which attack crops, in Australia, India, South Africa, the United States, Canada, or elsewhere, who does not quote her opinion as the highest authority upon any subject which she has written about. This is due to the careful and thorough manner in which all of her investigations are carried out. In the last number of "Insect Life" issued by the United States Department of Agriculture and edited by the highest living authorities upon economic entomology, the following complimentary notice of this work appears:—"On account of its convenient size, admirable arrangement, plain language, and abundant illustration, it is almost a model of what such a work should be."—"Miss Ormerod's work cannot be too highly commended."

Now the merits above enumerated are just the points which render this work so valuable, for it is perfectly intelligible to anyone who can read, and thus becomes almost indispensable to every farmer, gardener, or fruit grower, who would carry on his work in the most successful manner. Nor is this the case in England alone, where the work was written, for so many of the actual insects treated are common as agricultural pests both in Europe and in North America, and moreover the general principles recommended for the prevention of injury are applicable all the world over. Besides this from the fact that most of our most injurious insects are imported species, we know not at what moment any of those so well treated of in this work, may not appear in our midst as a serious tax upon our cultivated crops. The different kinds of attacks are arranged alphabetically under the three headings, Food Crops, Forest Trees, and Fruit. Some new attacks not mentioned in the first edition and which appeared subsequently to its issue, are now paid particular attention to, amongst these are the Hessian Fly, Stem Eel-worms and the Wheat Bulb-fly. The information concerning all the attacks treated of in both editions has been largely augmented and the special subjects of Wireworms, Turnip-flea-beetle, Mustard Beetle, and Hop Aphis are entered on at length.

Special attention has been given to the presentation of the latest developments in the way of preventive measures. Attention is drawn to the use of chemical manures which are highly beneficial as plant-stimulants (but by no means so to vegetable-feeding grubs and maggots), and the many kinds of agricultural implements, by which the soil can be more completely broken up on the surface, or the surface more thoroughly buried down than was formerly the case, these are of great assistance to us. As an Appendix to the Manual is given a short and copiously illustrated "Introduction to Entomology," where, in the plainest possible language, the structure and changes of insects are described, and illustrations and definitions of the various natural orders into which they are classified are given, so as to "enable the observer of a crop attack to tell at least what kind of insect is before him," and also "in the list of the orders of insects, notes are given of the most observable of the characteristic points by which the insects composing these different orders may be distinguished from each other."

A glossary of terms and a full index render this work very complete. It contains 410 pages, and is illustrated with 155 excellent figures, many of them from the authoress's own pencil. The frontispiece is a portrait of the authoress which has been prefixed by desire of many friends and will be of interest to many in this country who have not had the pleasure of meeting Miss Ormerod. The manual is well printed, neatly bound in cloth, and the small price at which it is published ($1.25) brings it within the reach of all.

There are many articles in the manual which are of interest to Canadian readers as they describe insects which also occur here—amongst these the following may be mentioned:

THE BEAN WEEVIL (*Bruchus granarius*).—Treating the seed with a solution of sulphate of copper and carbolic acid are recommended, also soaking the seed beans for some time before they are sown, or dropping them for one minute into boiling water.

THE CABBAGE APHIS (*Aphis brassicæ*).—In garden cultivation drenching the infested plant with soap-suds is practicable, syringing with an infusion of tobacco in lime-water has been found useful and dusting with caustic lime and soot are stated to be very effective in getting rid of the aphis.

THE SMALL WHITE CABBAGE BUTTERFLY (*Pieris rapæ*).—The greatest confidence seems to be placed in strengthening the plant, so as to enable it to outgrow the attacks of the caterpillars. In this country this is insufficient and undoubtedly the best remedy is pyrethrum powder reduced with 4 times its weight of common flour or finely sifted lime and then dusted over the plants.

CABBAGE FLY (*Anthomyia brassicæ*).—The use of barn-yard manure immediately before a cabbage crop seems to induce attack, also the continuous cultivation of cabbages on the same ground. The value of lime and ashes are emphasized by the experience of correspondents.

CARROT FLY (*Psila rosæ*).—This is an uncommon insect in Canada; but is found here and is liable at any time to develop in numbers. The remedies suggested consist chiefly of, careful cultivation of the soil so as to induce a vigorous growth, care at the time of thinning the rows and the use of obnoxious materials to deter the females from egg-laying.

STEM EELWORM (*Tylenchus devastatrix*).—"Clover sickness" and "Tulip, root" in oats are caused by small nematode worms. We have not so far observed these in Canada, but they have been studied in the United States and we should be on our guard, Some points in the life-history of the species are given in regard to which some common-sense remedies are suggested, such as not planting a crop liable to attack upon infested ground. It is shown that several plants are injured by the worms and that they can survive the operation of digestion in animals fed on infested fodder. It is the same species which causes stem-sickness in clover and "tulip-root" in oats. Grain Aphis *Siphonophora granaria*, Kirby. Early maturing varieties of grain are recommended. The full life-history of this insect is still unknown.

DADDY LONGLEGS (*Tipulæ*).—These troublesome insects are treated at some length. Amongst measures to be taken to lessen the quantity of eggs laid, are mowing down coarse vegetation in places suitable for the females to lay eggs, and feeding sheep on infested pastures. Draining of low land and the use of quick-acting fertilisers are suggested.

HESSIAN FLY (*Cecidomyia destructor*).—This well known pest has been specially studied by Miss Ormerod. The chief remedies are burning infested stubble and screenings, the selection of varieties least attacked, and the use of special fertilisers in the spring to strengthen injured plants.

WHEAT MIDGE (*Cecidomyia tritici*).—Deep plowing directly after harvest and the destruction of screenings seem to be the best remedies.

THRIPS (*Thrips cerealium*).—Deep ploughing and clean farming are thought to be the best remedies.

WIREWORMS (larvæ of the Click Beetles).—" Wireworms may perhaps be said to do the greatest amount of mischief of any of our farm pests ; they destroy root grain and fodder crops." So Miss Ormerod begins her article and it is almost as true for some parts of Canada. Great stress is laid on the preparation of the land before a crop liable to attack. Autumn feeding with sheep and the use of gas-lime and salt are highly spoken of. Sir Richard Keene writes "If the lea is broken for oats (our general crop) it is sure to be attacked more or less by wireworms; I top-dress with 4 cwt. agricultural salt, 2 cwt. superphosphate and sometimes 1 cwt. nitrate of soda. I have never known this to fail if applied in time. If the lea is broken in autumn, to have green crops in the following year, I have the land worked as much as possible and apply 8 tons hot lime to the statute acre ; lime as hot as possible. I always sow the seed with a liberal dressing of farmyard dung, for such crops as mangold, turnip, cabbage, carrot, and parsnip, and I use the following dressing of artificial :—2 cwt. best bone meal, 1 cwt. nitrate of soda, and 3 cwt. common salt. I find the plants are soon forced up beyond the reach of damage.

HOP APHIS (*Phorodon humuli*).—This is another insect which sometimes does enormous injury in Europe, and which has received particular attention from both the authoress and Prof. Riley whose studies have supplied important links in the life-chain of this insect. The remedies most to be relied on are the treatment of plum trees early in the season to destroy the first brood of aphis and afterwards " washing or spraying the hop plants when they are found to be infested.

RED SPIDER (*Tetranychus telarius*).—This is another of the dire enemies of the hop as well as many other plants. Washes containing sulphur or kerosene are suggested.

MANGOLD OR BEET FLY (*Anthomyia betæ*).—The remedy most spoken of is high cultivation ; but the benefits of a kerosene emulsion are suggested by the experience of one of the correspondents quoted.

Onion Fly (*Anthomyia ceparum*)—The remedies offered for this well-known pest are careful preparation of ground which has not borne onions the previous year, growing them in trenches so that the bulb may be kept covered, the removal of diseased bulbs, and the treatment of infested plants with what is practically a kerosene emulsion or simply with soap suds.

Slugs.—These troublesome mollusks are not insects but are treated in the manual because so frequently sent in by people who suppose they are. Gas-lime, lime, and salt if applied frequently at short intervals are sure remedies.

The Diamond-back Moth (*Plutella cruciferarum*).—This insect frequently so injurious to cabbages in this country is spoken of as an occasional pest of turnips. A dry dressing of gas-lime, one bushel ; lime from the kiln, one bushel ; sulphur, 6 pounds ; and soot, 10 lbs., was found useful.

In Part II. " Forest Trees and the Insects that injure them," there are no insects which actually injure our forest trees in Canada although the general principles of prevention and remedy give valuable suggestions.

In Part III. " Fruit Crops and Insects that injure them," we find many too well known enemies of the orchardist.

The Woolly Aphis (*Schizoneura lanigera*).--Of the many remedies given it seems to us that the treatment of the stem inhabiting form with soap-washes or kerosene emulsion will be the most effective, and the latter is probably the best remedy for the root inhabiting form which is so difficult to reach.

Apple Aphis (*Aphis mali*).—Syringing with soft-soap and other washes is recommended.

Codling Moth (*Carpocapsa pomonella*).—Scraping, banding, and washing the trees, form the chief remedies. Spraying with Paris green. This is the first mention of this now universally used American remedy. Up to last year Paris green as an insecticide was unknown in England. Now however at Miss Ormerod's suggestion it has been tried and has proved so successful that there is no doubt that it will rise rapidly in public favour. Probably some from carelessness or recklessness, in not following the instructions closely, will put on the washes too strong and injure the foliage ; but the benefits which will follow its adoption will be so enormous that Miss Ormerod will speedily be recognised as a public benefactor by thousands of the ignorant *educated* people in Great Britain who " did not know that grubs and creeping things were of any interest to them."

Mussel Scale (*Mytilaspis pomorum*).—This is our familiar oyster-shell bark louse. The usual soap washes in spring and the mechanical removal of the scales are recommended.

Gooseberry Saw-fly (*Nematus ribesii*, Curtis).—Great stress is laid on the value of removing the surface soil from beneath bushes which have been infested by the larvæ. Mention is made of some mixtures containing soot or sulphur. We are surprised to find that " white hellebore " is not mentioned.

Shot Borer " Pear Blight " (*Xyleborus dispar*).—A most complete article is given on this insect which has been very injurious in our Maritime Provinces for some years ; preventive remedies in the shape of washes to prevent the females from laying eggs are given.

Mottled Umber Moth (*Hybernia defoliaria*).—This moth is interesting to us from the fact that it has been taken on three occasions in Vancouver Island by Rev. George W. Taylor—whether indigenous or introduced is uncertain.

This is one of several moths which have been very injurious for many years in England but which have been successfully treated during the past season with Paris green. A long article detailing the experiments of the Evesham Fruit Conference with Paris green, under Miss Ormerod's guidance, gives an account of the successful introduction of Paris green into England as an insecticide. J. F.

THE RUSSIAN PARASITE OF THE HESSIAN FLY.—Miss Eleanor A. Ormerod, the eminent consulting entomologist of the Royal Agricultural Society of England, in a communication to the Mark Lane *Express*, thus refers to the discovery of this parasite :—

"It is announced in the United States that Professor C. V. Riley, the well-known entomologist to the United States Department of Agriculture, has introduced into that country living specimens of *Semiotellus nigripes*, a Russian parasite of the Hessian fly, in order to acclimatize it. By its aid he hopes to practically exterminate the pests in that country. Curiously enough he obtained this parasite from England, and it is said that quite a number have been reared for the purpose. If this is the case, there should be no difficulty in the way of adopting the same means of getting rid of the Hessian fly in this country, and it would be interesting to have Miss E. A. Ormerod's opinion on the subject."

My opinion is that, quite certainly, it would be worse than useless (in this country) to make any such attempt. In the United States of America things are on a very different footing. There are differences in temperature, conditions of climate, and also of area of cropping, and other agricultural arrangements which must affect this question. Likewise there are special arrangements at the Government experimental stations for rearing insects, and skilled Government entomologists who can trustworthily examine the collections before they are turned loose on the country.

The parasite fly (the *Semiotellus nigripes*) is only about one line long, and without the help of a magnifying glass and some technical knowledge it would be impossible for any but skilled entomologists to be certain whether many pests were not included amongst the parasites which they set free. Also it is to be remembered for the most part insects pair; lay eggs, and die very shortly after they make their appearance from the chrysalids, but even supposing these minute creatures lived on awhile, where are they to be taken to?

We do not know what corn is infested until attack is thoroughly set up, for the most part till the mischief is so advanced that the time for action of the parasite is past; and at a vast expense the intended destroyers would in many cases be carried where there was nothing to destroy.

This work of rearing could not be done on a broad scale—that is, by collections from the threshing machine by farmers—and the payment to a staff of collectors. rearers, and distributors would involve enormous outlay.

The present plan of destroying the Hessian fly chrysalids in the fine screenings is much the safest, and also has, for this country, the stated approval of Prof. Riley himself. It is easily done, costs scarcely anything, and causes no loss; and thus, though we destroy the parasites (of which there are several kinds), we also quite certainly destroy the pest.

VII

THE CLERK OF FORESTRY.

To the HON. JOHN DRYDEN,
Minister of Agriculture, Ontario:

SIR,—I have the honour to forward the Forestry Report for 1889-90, being the sixth issued, which will be found to contain:—

Valuable articles on the best methods of tree-growing, and actual results obtained by three of the most experienced tree-planters in Ontario.

Extracts from Dr. Mayr's Report to the German Government on the condition of the North American forests, translated especially for this Report.

Complete statistics gathered from New York and Michigan States and Ontario concerning the effects obtained from windbreak protection.

Instructive correspondence from all parts of Ontario respecting the forestry experience of different sections.

Articles contributed by Professor Fernow, Washington, on Forestry, and by Dr. Bryce, Toronto, on Forests in Relation to National Health.

Respectfully,

R. W. PHIPPS.

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INTRODUCTION.

This present report, intended, as were former ones, to check the deforesting of Ontario, and encourage, as far as lies within its power, replanting, will be found to contain much new information with regard to the various branches of forestry, and the advances being made in that direction, both in this and other countries.

It is gratifying to be able to state that, in many parts of Ontario, much greater thought is now being given to this matter than formerly. In the more wooded parts of Ontario, of course, clearing still goes on, but it is not done under the impression which once seemed to exist, that the supply of timber was everlasting, and many settlers, warned by the example of the front townships, are giving thought to retaining a sufficient reserve of timber on their farms, though it cannot be said that there much planting is being done.

In the older townships, however, which have lost a great part of their original forest, much interest is being taken. Last spring, I have travelled some thousands of miles through Ontario, and in all directions could be seen lines of young and lately planted trees, along the fences and roads. It is true that many of these had not been so well cared for since planting, as they might have been, and some had died. Still, a large proportion were thriving, while occasionally, a farmer had planted an extended treble or even quadruple line of trees I did not notice, however, plantations of some acres of young trees such as one frequently sees in the United States; but these will arrive in time, while at present it is safe to say that much interest has been aroused, and that many thousand more trees are being annually planted, than has ever previously been the case in Ontario.

It must not be supposed that this at all so general as could be wished. In many localities little is being done, but a commencement has been made, and we know the proverb which says, " What is once commenced is half finished." One feeling, which is having great influence, is this :—Many farmers have an idea at some future period, of selling their farms ; and a farm does not sell nearly so well if quite cleared, as if it possesses a thriving piece of forest. So, to preserve such a piece, on many farms, cattle are now being fenced out of a portion of wood land, and some attention paid to thinning or otherwise caring for the young trees, which, where sod has not taken possession, soon spring up.

It is greatly to be hoped, however, in the interest of Ontario, that much more rapid progress will be made. If every farm possessed (what a little trouble would give it) five, ten or fifteen acres of good timber, having besides, its orchards and outbuildings sheltered by a beautiful wind break, say of the Norway spruce, or our own more lasting, if slower growing, white pine, life on the farm would be more comfortable, travelling in winter much easier, the appearance of the country greatly benefited, the most important crops, both of grain and fruit, greatly increased by the shelter afforded, and, above all in value to the country, the climate would be greatly improved, and the rainfall more regularly distributed.

On the last mentioned point a few additional words may here be well said. Throughout all North America, or rather that vast portion formerly wooded, the settler in general has pursued but one course. He has cleared more of the land than he can farm to advantage; the absence of a sufficiency of trees has seriously diminished the crop of grasses, and thus it is hard to obtain enough manure to allow it to be kept in good tilth. The result is, emphatically, that the land is drying up, and being washed away into the water courses. To use the expression of the late Captain Eads with relation to the great Mississippi valley, "the United States is tearing out the heart of the country with her gang-plows and throwing it into the Mississippi river." We have been too long, both in Ontario and Quebec, washing our land in this way into the St. Lawrence and the lakes. This is one of the great evils which the forestry movement is intended to check. We shall now notice what progress is being made in forestry elsewhere.

FORESTRY REPORT, 1889-90.

FORESTRY INTERESTS IN THE UNITED STATES.

Limited space permits only brief mention of the most notable events in the progress of forestry reform through the country during the last year.

Early in the year and soon after its annual meeting at Atlanta, Ga., a committee of of the American Forestry Congress waited upon President Harrison and presented a memorial urging the adoption of an efficient Government policy for the preservation and protection of the public forests, and expressing the hope that the President would call the attention of Congress to the subject with a favourable recommendation of the action which was desired by the Forestry Congress.

At the meeting of the Forestry Congress (now having changed its name to that of the Forestry Association) at Philadelphia, in October last, a petition to Congress was adopted, urging the passage of an act withdrawing from sale all forest lands belonging to the nation, and committing them to the custody of the army, until a commission shall have determined what regions should be kept permanently in forest, and shall have presented a plan for a national forest administration. The appointment of such a commission through the President, and necessary appropriations, were also asked for.

The desirability of having a course of instruction in forestry at the agricultural colleges and of forestry experiments at every experiment station formed the subject of another resolution.

It deserves to be noticed also that the American Association for the Advancement of Science, at its meeting in August, at Toronto, appointed a committee to represent the forestry interests of the nation to Congress.

Pursuant to the action of the Forestry Association, a forcibly written memorial has been addressed to the United States Congress, asking that the public lands in the arid regions of the West be withdrawn from sale, until it can be determined what portion of them are situated within the natural water-sheds of streams ; that these be placed in the custody of the Department of Agriculture, the timber only thenceforth to be sold, and the land kept as a permanent forest reserve.

A similar memorial has recently been presented to Congress by a committee appointed at a convention of the citizens of Fresno, Tulare, Kern and Merced Counties of California, asking for the permanent protection of the forests lying upon the water-sheds of those counties.

A memorial prepared by the State Board of Forestry of California presents the same requests in a broader application.

A movement has also been made in Colorado for the establishment of a public park in that State, a principal object of the movement being the preservation of the forests of a region which is the source of several large streams.

The fourth annual report of the Ohio Forestry Bureau shows a gratifying progress in advancing the interests of Forestry in that State.

In Pennsylvania, although the Forestry Association failed to secure from the Legislature the establishment of a permanent Forest Commission, they were successful in obtaining the repeal of the fence law, which had been upon the statute book ever since the year 1700 ; a law which left the forests of the State largely exposed to the intrusion of cattle and their consequent injury. The repeal of the law will be of great advantage to the forests which remain.

In New York the report of the Forest Commission for 1888 indicates the need of a change in the laws in regard to the redemption of the land and the cancellation of the titles, in order to prevent the loss by the State of much land, valuable as a part of the forest reserve, which recent enactments have been designed to secure. The commission also asks that the further extension of railroads in the counties embraced within the forest reserve shall not be allowed, as such extension cannot be regarded otherwise than as a calamity. They also ask for such an appropriation from the State treasury as will enable them to purchase, for the purpose of increasing the forest domain, such forest lands as can be bought at a fair valuation.

In New Hampshire, the last Legislature established a commission "to examine and ascertain the feasibility of the purchase by the State of the whole or any portion of the timber lands upon the hills or mountains of the State, near summer resorts, or bordering upon the principal sources of the water supplies needed for manufacturing purposes, with a view of preserving the same as public lands and parks." The commission is organized and actively at work.

In Massachusetts a notable forestry movement has been made by the town of Lynn. At the first settlement of the State, Lynn, the second town established in it, had a wild piece of woodland which was held in common until 1706, the proprietors being free to enter it and cut fuel and timber to supply their needs. At the date mentioned the tract was divided among the landowners. It is a region of rock-ribbed hills with bold ledges and precipitous crags, the intervening glens and valleys coursed by clear and rapid brooks and rills and having in their depths extensive swamps and ponds. It is now to return to its original character of a woodland held in common, and be, in addition, a free pleasure ground. The city council lately decided to take advantage of the public park act of Massachusetts, and made an appropriation of $30,000 for the purchase of the land, which, with private subscriptions, gives a fund of about $450,000 for the purpose. A board of park commissioners, evidently the right men for the place, has been appointed, and they are now taking the land by right of eminent domain. The park commission, the water board, and the public forest trustees will act in harmony in the administration of the region as a public forest—which it will be pure and simple, with no attempt to incorporate the ordinary park features into its plan. There are about 800 acres to be taken, which, with that already held by the forest trustees and that taken by the water board—including 200 acres in the ponds—will make a total of about 1,400 acres, which may be still further increased. This forest will be the largest area dedicated to park purposes in New England. As a writer in Garden and Forest has said : "Lynn has thus led the way in establishing the first public forest, and thus set a noble example which ought not to be without effect upon other communities."—*Washington Forestry Reports.*

PROGRESS AT WASHINGTON.

During the year, in addition to making up reports, travelling, and delivering forestry addresses, the United States Commissioner at Washington has sent many young trees to the following States :—Dakota, Nebraska, Kansas and Colorado. The names of the species, the number sent to each State and the number living after one year will be found in the following table :

Names of Species.	Dakota.		Nebraska		Kansas.		Colorado	
	No. of plants sent.	Per cent. living.	No. of plants sent.	Per cent. living.	No. of plants sent.	Per cent. living.	No. of plants sent.	Per cent. living.
Pinus Sylvestris (Scotch Pine)	575	7.	350	14	725	3.4	500	8.4
Pinus Austriaca (Austrian Pine)	575	5.22	350	9.1	700	0.57	500	9.6
Pinus Strobus (White Pine)	400	5.25	25	0.0	125	0.	25	0
Pinus resinosa (Red Pine)	0		0		0		0	
Pinus mitis (Short-leaved Pine)	0		0		0		0	
Pinus ponderosa (Bull Pine)	0		0		0		0	
Pinus laricio (Corsican Pine)	250	11.6	0		125	0.	25	0
Picea excelsa (Norway Spruce)	500	8.8	25	16	0		0	
Pseudotsuga Douglassi (Douglas Spruce)	225	0.9	225	24.4	325	.61	350	5.7
Libocedrus decurrens (California White Cedar)	0	0	0	0	0			
Juniperus Virginiana (Red Cedar)	0	0	0		0			
Taxodium distichum (Bald Cypress)	0	0	0		0			
Larix Europœa (European Larch)	475	9.47	25	0	0			
Fraxinus Americana (White Ash)	125	60.	0		0			
Fraxinus viridis (Green Ash)	175	44.6	75	60	100	21	200	31
Prunus serotina (Black Cherry)	25	48.	5	80	5	0	5	20
Gleditschia triacanthos (Honey Locust)	4	0	25	20	125	44	325	29.8
Robinia pseudacacia (Black Locust)	25	0	25	4	0		0	
Catalpa speciosa (Hardy Catalpa)	75	25.3	275	62.9	600	50.5	175	33.14
Acer dasycarpum (Silver-leaved Maple)	150	40.	25	24.	25	1.	0	
Negundo aceroides (Box-elder)	150	60.7	25	80.	25	80.	25	100
Maclura aurantiaca (Osage Orange)	4	0	0		0		0	
Total	3733	14.62	1455	26.06	2880	14.76	2130	16.66

THE OTTAWA GOVERNMENT.

The Ottawa Government is lately doing some work in forestry, principally however, with a view to tree planting on the prairies. What is being done is thus described :—

" First, to induce and encourage a desire on the part of the settler in the colder and more exposed portions of Canada, for tree planting and shelter belts ; second, to ascertain by carefully conducted tests in different sections which varieties are most desirable, and third, to plant those varieties of trees best adapted in such as will tend to bring about the more favorable forest conditions as above noted. Of course this last proposition is one that can only be taken up after the satisfactory solution of the second.

Belts of forest trees, 150 feet wide, have been planted on the north and west sides of the Central Experimental farm, comprising about 10,000 trees. The one on the west side is made up of forty or fifty different species of deciduous and coniferous trees. They have been planted in irregular groups, overlapping each other in different forms, which detracts from the stiff effect that square blocks present. The other on the north side has the same varieties, with the addition of certain hardy shrubs indiscriminately mingled at regular distances—somewhat approaching natural forest conditions. This, when compared with the other, will in time give accurate data in regard to the relative benefits of what might be called mixed and individual planting. Also in relation to hardiness, rapidtiy of growth, freedom from insect pests, timber value, which may be expected to add much to our present knowledge of timber culture. Thus far none of the catalpas, honey locust, Russian mulberry and American sycamore have proved entirely satisfactory, suffering from the cold each winter. Black walnut, when grown from northern seed, promises to do well. Trees grown from seed three years ago and undisturbed, are now six to seven feet high. Box elder, Russian mulberry, black cherry, yellow locust and soft maple (acer dasycarpum) are the most rapid growowing varieties in the belt; although for economic purposes white ash is one of the most valuable trees to plant.

One of the first things undertaken in connection with this department of horticulture was to obtain a large collection of the seeds of the hardiest Rocky mountain and East European conifers, including the beautiful blue spruces and magnificent firs of the former region, and the hardy forms of Riga and stone pines of the latter. As a product from these collections, about 175,000 seedlings were transplanted from the seed beds last spring and will be reserved, when of proper size, for distribution to points where their usefulness has not yet been tested. The branch farms, of course, will receive liberal consignments of these; as well as other experimenters who can be depended upon to give careful returns.

For the past two years distribution of trees has been made to the C. P. R. gardens, twenty-five in number, and situated at different points along the line. The Indian and mounted police stations have also been the recipients of liberal collections during the same period. All these stations, covering a variety of soil and climatic conditions, will very speedily bring such light to bear upon the forestry question in the North-west as will enable the settler to select with greater certainty the trees likely to be adapted to his locality.

The above work was supplemented last spring by a distribution of 100,000 small forest tree seedlings, of the hardiest variety obtained from northern sources. These were sent to voluntary applicants in bundles, each containing 100, and were carried through the mails free of charge. Very satisfactory reports have been received as to their condition on arrival and the growth made after planting. The reports to be sent in after wintering will, however, be much more valuable. Arrangements have been completed to continue this line of experiments on a larger scale, and double the number will be sent out the coming spring.

WORK IN ONTARIO.

In Ontario during the year, in addition to compiling the present report, many forestry lectures have been given, and the press has been largely used for the circulation of forestry literature, over 600 letters and articles having been printed in that of Ontario alone. In addition, the Ontario Government fire rangers, of which a large number are employed, half their expenses being paid by the Government, and half by the lumbermen, have been doing good service. This is a most important work, as forest fires in Canada have destroyed immense ranges of valuable woods. The bonus promised for planting lines of trees has had an excellent effect, many thousand trees having been planted under its influence.

EUROPE.

In Germany, where forestry is regularly pursued as a science both by the Government and individual proprietors, the work of one year shows little dissimilarity, to that of another. All through the country, a portion of each forest will be cut down, and a similar portion planted. This is done in regular rotation so that next year another portion of the forest will be fit to cut, the next year another, and so on until they come back to the one planted this year. Managed in this manner, the forest lasts for ever, and from the even distance of planting and careful management, an acre there will yield much more timber than the same amount of land in the virgin forests of Canada.

In France and other European countries, though the system of tree growing is not always so exact or scientific, much care is being taken of the forests, especially in planting the sides of precipices.

It should not be forgotten that the United States, and the Dominion Government have made large forestry reservations in the West, but it is one thing to make reservations, and another thing to keep them so when settlement begins to surround them or careless tourists, (as is already the case in both of these) occasion destructive fires.

HOW SHALL WE PROTECT OUR FORESTS ?

The following article was written in reply to a request from the American Association of Science, the object being to sketch out a plan applicable to most or all American communities :—

Arousing Public Opinion.

Each State or Province should employ a competent official to obtain information on the subject, and circulate it by means of pamphlets generally called Forestry Reports. With these, two things are advisable ; first, that they be written in an interesting style, for mere dictionary statements on the subject would simply be left unread ; next, that they be widely distributed, and among proper persons, not merely sent to officials and prominent men, on whose shelves they are likely to remain untouched. An excellent method is that of obtaining, from some well informed person in each locality, the names of all he knows likely to read with profit such a book, and sending one by post to each on his list. In addition to this, it will greatly aid if the forestry official be able to address, during each year, many communications to the press throughout his State or Province. In addition again, addresses delivered at many points each year will be found of great service.

FREE DISTRIBUTION OF TREES.

Young saplings, obtained in the forest, are very inferior to nursery-grown plants. The forest sapling has generally two or three long roots, which cannot be obtained in full extension, or carried or planted if they were. They must be cut and the chance of growing risked. Then, many of them are grown in the shade, and will not stand the open sun. On the other hand, the nursery-sapling, twice at least transplanted as it should be, gets a more bunchy and fibrous root each time, and naturally grows far better when placed in its ultimate position. Very small trees, especially evergreens, can be, indeed, and often are, taken from the forest and planted in the nursery, when, after two transplantings, they have excellent roots. But when obtained from seed, or when young from large nurseries, the work is far more easy and certain. When one goes for trees to the bush, though saplings apparently be countless, it is surprising what trouble it will take to find what is wanted, and to get fair roots then. Again, in our settled country where cattle are often made free of the bush, young trees are hard to get in any case. For all these reasons, if the farmer had available, when he was ready, some thousands of good, well-rooted healthy saplings of the kind he wishes, he would often be willing to plant and care for them. Therefore, I consider that a large public nursery, where trees might be obtained free of cost, would be one of the greatest inducements to land-owners to plant. It will not do to say that he who wants trees should buy them. There is an inducement needed here, or the work may not be done. The work is national; it is the nation desires the farmer to plant the trees; it was the fault of the nation that he was ever allowed to obtain public land at first without an agreement to retain a certain portion in trees. I have now, for seven years, been examining this subject, and I am strongly of the opinion that under a system of free saplings, twenty times as much planting would be done as at present. Instead of free nurseries, governments sometimes give grants of orders on nursery men. With careful and earnest supervision, either plan would answer. The great point is—free distribution of young trees.

SETTLING FRESH WOODLAND.

The great error of the original settlers was taking hill and hollow, mountain and valley, indiscriminately, for settlement. The result is that many mountain tops were cleared, farmed, and ruined, for the soil washes away, and in a few years nothing remains but to desert it and go elsewhere. That the mountain should be wooded and the sloping valley cropped is the very A B C of forestry, and this should be secured by saying to the settler, "you cannot have such a lot; it is a mountain top; it must stay in wood; and if you take such a lot you must agree to keep such a part in wood, and to keep cattle out." This may seem harsh to the settler, but in the end it would be far better for him. If there is one lesson more than another which over-clearing has taught America, it is that people should not be allowed to enter the woodland to hack and hew as they please. There are now millions of acres of deserted and worn-out farms, in the Eastern States and Canada, which were simply the elevated ridges, fit, with care, to bear timber for ever, but not fit for farms, as the earth washes off. It is hard for the settler in a forest to know the elevation, but the survey should have regulated matters. I wish it to be understood that here I speak from my own experience. When over thirty years ago, with no one to guide us, many of us entered the forest, we cleared much land that should never have felt the axe, and is now worthless, or very near it. This is not proposed in the case of the ordinary rolling land of the country, nor where there are a number of small hills. But where thousands of acres form the water-shed of a mountain range, they should remain in wood.

FOREST RESERVATIONS.

Forest reservations of twenty or thirty miles square, should be left at those places, found in most countries, where the sources of many streams arise, that the rivers which pass thence through the rest of the country, may be preserved. These will form reserves where timber will grow, to be thinned, not [cleared, at maturity; they will also give shelter where birds and animals, otherwise in danger of extirpation, may still live; and, as the country around is cleared, they will be invaluable for summer resorts. These would, if cared for, remain beautiful remembrances of the pristine forest, full of sylvan glades and delightful groves, retaining the undergrowth, the wild flowers, the deep leaf bed, the pleasant freshness of the virgin forest. In this state they are most valuable preservers and distributers of moisture. But if left without care, fire will here and there burn the hills to the barren clay, cattle will destroy the undergrowth, and the whole scenery appear dry and desolate, compared with what it was, and might still have been. Two things, then, are here necessary: prevent settlement there and appoint caretakers.

REMISSION OF TAXES ON WOODLAND.

It would greatly assist in preserving a considerable amount of forest throughout the country, if taxes on woodland, where the country is sufficiently cleared, were in all cases remitted; and if, in the same connection, some stipulation were made that cattle should, to a proper extent, be excluded, very great benefits would follow. For it may be here remarked that a wood dried up and hardened—its undergrowth destroyed by cattle—is of very little value climatically, compared with one where the forest-bed is preserved. Neither will it remain a store of fuel, or, there being no young trees, the forest must ultimately die. There is no doubt, however, that many of these wood-lots are allowed to decay, because it is intended to clear them up, and that, if the remission of taxes induced the owners—as it in most cases would—to keep them as permanent forest, much better care would be taken of them.

TREE CLAIMS.

In prairie countries, sections of land have been given free to settlers, on condition that a certain number of acres, generally ten, were planted with trees, and kept in good condition for a certain period. This has been tried for years in the States, but many frauds are said to be perpetrated under it. I have myself found when at the great private nurseries in the West, where the young trees were procured, that it was always a practice to purchase the worst—the culls, in fact, for tree claim lots. The system was nevertheless valuable, but needs to be carried out in good faith, by competent and firm inspectors. The prairie lands of both of Canada and the States, urgently need tree-planting, and will give good returns. Plantations of miles square have been grown these eight years in Kansas by railroad companies, and with good paying results. Yet, even with this successful example before their eyes, settlers plant little. When I saw them they were four and six years old, yet still the prairie for hundreds of miles was comparatively treeless, though all admitted the benefits of trees. I should recommend in prairie countries, while the soil is yet in government hands, that many millions of young trees be planted and cared for under government appropriations, cultivated to keep down weeds for a couple of years, and the prairie close by ploughed to prevent fire running to the trees. In this we should not wait for experiments long. It is necessary to plant four times as many trees as needed, to allow for thinning, and by planting different varieties, it would be easy so to arrange them that even if three-fourths failed, we should still have a forest. But three-fourths would not fail. This would cost millions of dollars, it is true, and it is equally true that it is a matter in which, above all others, millions should be spent. If, when I first saw the prairie States, between thirty and forty years ago, an appropriation of ten millions of dollars had been given to plant trees and care for the groves then existing, these States would, I am well assured, be more valuable by a thousand millions of dollars now. Can nations not afford such sums ? Let us think of the sums they are without exception ready to spend in war, and then answer. But that, it may be said, is to preserve national life. So is the other. Every well-informed student of history is aware, that in all the past, as the forests of a country were destroyed beyond a proper proportion, national life weakened, and by the time when, as examples show us, the land had become but a treeless desert, the nation was dead.

PRESERVING TIMBER FORESTS.

The preservation of these has been little thought of in America, and the lumberman, on condition of paying the authorities a certain amount, has been too often allowed to cut at his pleasure. No care has been taken to replant forests.

In Europe, on the other hand, the wood-buyer is carefully instructed as to what portion he may clear or thin, while, as soon as the ground is ready, it is again planted, or the gaps filled. Two reasons for the American practice existed: first, farm land was needed. This reason is not now valid, as the pine land now left is very largely too poor for agriculture. Second, and chiefly, the timber could be sold. Matters have now come to pretty much the following condition. This generation, say for thirty years, will have timber enough, though they will have to use much wood hitherto thought unfit. After that, there will be little good pine, and not much good hardwood in our present forests; what is obtained will be brought from British Columbia and the forests of the Southern States, while the generation following will exhaust these. Considering the well-known benefit of keeping a large section of the country in forest—benefits which it is not the province of this paper to state—I would earnestly urge the people of America to consider how much more advantageous it would be at once and decidedly to say of certain large portions now in forest, "These shall not be cleared for settlement—these shall be sacred to the tree." Once this determination is arrived at, the rest is easy. Nothing is more simple than to introduce and maintain a method of forest preservation, if populations demand it, and governments fulfil their desires.

It is often said, "We have a large proportion of forest land." But most of this is not good forest. Much has been over-run by fire, much culled of every good stick by the lumberman. But nearly all of this might be renewed, and made good, permanent forest. if the means were used.

MEANS USED IN ONTARIO.

I will close this paper by stating what is done in Ontario for forest preservation. Much forestry literature has been for years circulated by the local government, and with good effect. A money bonus, half paid by government and half by the township, is given for the planting of lines of trees, in good condition after three years, in every township which chooses to adopt the law. Over fifty rangers, half paid by government and half by the lumbermen, are kept in the woods during the summer months to prevent fires—a very valuable measure. An Arbor Day is also yearly held, with excellent results.

Finally the answer to the question, "How shall we protect our forests?" is "Spend more money in their preservation, and be less eager to make money by cutting them down."

FORESTRY OUTSIDE OF FORESTS.

While it is very necessary to preserve the Canadian forests, it is hardly so necessary, using the meaning generally given to the phrase, as is the exercise of other forestry precautions. By the phrase above used is generally meant the long stretch of forests to the north of cultivated Ontario, leased or unleased to lumbermen, partly culled by them and partly yet untouched, not at all, we must remember, such a forest as we cleared in old Ontario—we may look in vain for the immense stretches of great maples and tall beeches once so common to the eye, nor do we often see even a specimen of the large pine trees, which in deep and lofty groves once intermixed the maple forests throughout much of Ontario. But these are no more. North of us we have a vast forest containing much pine and hemlock—much young poplar on the burnt lands—here and there an immense black birch—here and there some beech and maple, But this great forest is to our north, and cannot in its principal climatic bearing greatly influence older Ontario. The south-west wind is the rain bringer—its rain clouds are precipitated by this forest, and fall in showers somewhere to the north of it. They do, indeed, greatly help the more southern counties in another manner, that is, by preserving from drouth the sources of the streams which run this way.

We will put aside for the present the question of these northern forests. What is much more important to the inhabitants of Ontario is the preservation of the small portions of forest yet remaining in her older districts, and the adding to them of many more. It is not, in fact, where our large forests exist in Ontario that forestry is most needed. The main effort should be where the country has been mostly cleared, to endeavor by planting wind-breaks of one or more lines of trees—by commencing plantations of young trees taken from the forest or purchased from nurserymen, afterwards to be replanted at greater distances ; and by —perhaps the chief of all—endeavouring to preserve what small portions of forest we have left standing there, that we can hope to bring back, to any considerable extent, the former climate of Ontario.

That this climate was far better calculated to aid fertility than our own there is now no question. In one year I have obtained the testimony of above two hundred farmers on the matter, and their unanimous evidence was to the effect that years ago, when there was still much timber standing, most crops gave a far better return than since more has been cleared. There is no denying that this is largely the case. The fall wheat, for instance, grew very much better, and with this of course the clover flourished. When we consider how valuable these two crops are in a proper farming rotation, what we have lost by the change of climate can easily be calculated. Speaking of the evidence mentioned above, it was principally obtained by a thorough examination, lot by lot, of two townships in northern and southern Ontario, obtaining the opinion of their holders as to the difference between the climate now and that which existed when the country was one-third or more forest. Their statements were almost invariably as follows :

That the rain was, to answer the farmers' purpose, much better distributed throughout the year, there being during spring, summer and autumn, frequent mild and fertilizing showers, lasting perhaps for days, penetrating deeply into the earth, and remaining there for a considerable period before drying out ; thus giving that continuance of warmth and moisture to the land which affords the growing plants the best opportunity. Neither was this weather, except perhaps in rich low soils, more productive of rust than that of the present day.

That now, on the contrary, rain too often falls in heavy sudden masses, beating the young plant into the ground, or causing the grown grain to lodge.

That these heavy showers tend much to weaken and impoverish the land, especially where at all sloping, by carrying away the richest soil; for instance, where furrows had been ploughed down a slope and heavy rain came on, each would resemble the next morning a deep water-course.

That formerly, when sufficient shelter existed, rapid winds had no injurious effect on the soil, but that now they dry the moisture too rapidly out of the land.

That owing to the combination of these causes, added to the fact that very few farmers had the means of procuring sufficient manure to supply the deficiency, a large proportion of the land in the country no longer produced the same amount of certain crops which could be formerly grown on them with much less labor.

That wherever the woods have been cleared in too great proportion, numerous springs which formerly existed had altogether dried up, and even creeks and small streams, once running the year round, were now, excepting in times of floods, nearly or quite dry.

That in connection with this the moisture had receded from the surface of the earth—that is to say that where water might easily once have been obtained at a few feet in depth, now wells must be sunk much deeper before a spring is struck.

The general impression was in all places visited—an impression corroborated by statements from many different parts of the Province—that too many trees had been cut down. It was found also that generally farmers of means, who were able to do so, were planting many trees, mostly in lines along their fences, for the purpose of wind-breaks. Many others of less capital stated their intention of doing so when able. Few large plantations of grown trees planted with this view were found, those existing, planted perhaps twenty or thirty years ago, having been set out more with the view of open parks than with any forestry purpose. Many farmers, however, had numbers of small trees growing in nursery patches, some from seed, some purchased in quantity when very small plants from nurseries either here or abroad, which they intended when large enough to set out elsewhere. As for the portions of old forests still standing on various farms, many farmers allowed their cattle to run in them—a proceeding of course fatal to the continuance of the forest, as the young trees being thereby destroyed, its means of perpetuation are lost. On the other hand some, with a view to preserve a portion of bush, had carefully fenced it.

It was also generally stated that wherever trees and shelter were plenty much better crops of both fall wheat and grass, especially clover, were secured.

From these data taken altogether the conclusion was drawn that while the principles of forestry are rapidly being better understood throughout the Province, and in many cases acted on, there is as yet scarcely one-twentieth as much being done as should be.

With the many competitors now in the field, Ontario cannot profitably remain a wheat growing country. Her main hope for the future must be in grass and cattle, and it is impossible to produce these profitably and in large quantities in a dried up land. Too many farmers are now, in the effort to raise a few cattle, killing the goose that lays the golden egg. They are allowing their bush lots to be dried up in order that their cattle may run through them and get some shade and a little pasture. In a little while the young trees are eaten off, none grow up to replace the old ones, a poor sort of grass overspreads the earth, the large mature trees fall one by one, and shortly all is so open and worthless that the farmer thinks it would be far better in crops and cuts it down.

As far as the cattle are concerned they benefit but little by it. As a long experienced farmer and planter elsewhere in these pages remarks, one acre of good grass outside the forest is better than twenty acres in. There are, however, other ways whereby shade and bush pasture may be had for the cattle. In the first place a portion might be set apart for them and a portion for forest. In the next place groves may be planted so near grass-fields as to give shelter without allowing the cattle within them, if of trees likely to be injured thereby. They are sometimes planted in the form of St. Andrew's cross, sometimes in that of a double crescent divided in half by the fence between two fields. There will then be shade as the day passes on from all points of the compass in these two fields

What injury cattle will do to forests when in good leaf, and how rapid is its progress when there is no good pasture to be had outside, few are aware. They will easily pull down saplings fifteen or sixteen feet high, bite off all the leaves in the head, let the tree fly up again if they have not broken the stem, and pass on to another. They will, too, destroy much older and much better trees. I have seen one walnut plantation out west nearly ninety feet high and the trees two feet six inches through at the butt. They are not mature yet, but the owner expects in about fifteen years' time that they will average five hundred dollars a tree, which, as there will be a hundred large trees to each acre, will be $50,000 an acre—many times as much, of course, as could have been raised in crops on any adjoining acre. There is an adjoining acre, however, where cattle have shown what they can do. It had to be cut off from the rest to allow the cattle, which are many and large, to pass to another part of the farm. There are or have been in it about a hundred walnut trees which must have formed a fair grove at the time it was thrown open, as the trees are many of them sixty feet high. But they are all dead—the acre of land has been tramped hard all round them and their trunks have been rubbed by the cattle till the outside of the bark is all rubbed away

Here had been, as well as I could calculate, fifty thousand dollars lost in order to yield an amount of pasture and shade which could easily have been obtained for four hundred.

As described above, some similar process is going on all through our country, wherever the old portions of forest are being allowed to dry and wither down, largely assisted, in many soils tending to be shallow, by the wind perpetually blowing down outside trees (a thing to be checked by planting evergreens at the outside.) Then there is the perpetual demand for fuel, and as described, the inroads of cattle, of which Professor Sargent, the chief authority in America, has said that "not all the injury by axe and fire has done so much harm to the American forests as the browsing of domestic cattle."

There is every proof that by deforesting we have rendered Ontario no longer the fertile land it once was. The climate has deteriorated, but as in the case of springs which, dry for years, were renewed when a fresh growth of trees was planted round them, so our climate is capable, without any unreasonable care or expense, of being renewed again to perhaps its pristine vigour. We want our lands in the future valuable for dairy purposes, for butter, cheese and the raising of cattle ; and where forests, rich grass and flowing streams exist is the very home of these. The possession of many cattle makes the growth of crops easy. What is wanted is to have the great expanse of cultivated Ontario not indeed again reforested, but to revive again a sufficiency of our forests. It is doubtful whether, over much of that country, the true forest, valuable for climatic purposes, covers more than one-twelfth of the surface ; for as we pass through what are supposed to be small forests we find many of them little better than a sort of mongrel description of park—a hard hoof-beaten surface covered with short poor grass with a few large trees, the small trees, except those that are worthless, all eaten down. These cannot serve the purposes of forests—the forest soil is gone, it has no longer the power of holding water—of storing up reservoirs of rain to be furnished to the dry springs in due season ; nor has it the vast mass of undergrowth covering the surface of the earth that keeps cool and moist the actual forest.

Of actual forest in good condition there is probably scarcely one-twelfth throughout much of Ontario. To raise this to one-fourth should be our object, and this is that forestry outside of forests we should endeavor to promote. When people talk of the forests of Ontario, as to whether they are being taken care of, they are too apt to think of the lumber districts. These of course are valuable—they bring a large revenue—and though some politicians complain of the way in which they are managed, they are certainly better cared for than any other forests in America. But if we could by reforesting bring back the former climate—the summer showers and fertile growth of older Ontario, the profit to our people would quadruple that which the lumber forests can ever bring us, manage them how we may. It is forestry outside of forests that we need most in Ontario.

MR. GOTT'S OBSERVATIONS ON FRUIT AND FOREST GROWING THROUGH WESTERN CANADA.

I must ask my readers to go carefully through the following article, which will profit both those who grow fruit, and are interested in sheltering their orchards, or who are planting or intending to plant trees for forest purposes or general farm shelter. Mr. Gott is a successful fruit grower, and in the matter of forest and shade tree planting and raising, few plantations I have seen are equal to his. It is about six years since I have seen his place. I particularly remember that the wind-break of Scotch larch of which he speaks was then very fine, and must now be most beautiful and useful. With regard to what he says concerning the free distribution of young trees, it should be remarked that, although not succeeding as well as might be wished, yet where it is desired to plant large surfaces, it is hard to suggest anything better. Mr. Gott objects to it also as interfering with private enterprise. It is not considered to do this to any great extent in other countries, such as those of Europe, in some of which it is largely used. There are two reasons why this should be the case. In many governmental affairs, governments though maintaining large establishments of their own for the purpose, are by no means hindered from taking, in time of need, large contracts from outsiders, as may often be noticed in the building of ships, and the purchase of material for warlike purposes. So, also, governments which maintain nurseries for purposes of free distribution, often give large orders to private nurserymen, who furnish them with trees at a low rate for the same purpose. It furnishes, too, a sort of counter-check; the government nursery, if well managed, should afford an example in the matter of growing trees well while the private nurseryman, on his side, who gets a government order for young trees, can afford the stimulus of showing how quickly and cheaply he can grow them.

The second reason I wish to give is as follows: Let us suppose the government giving out many young trees, and farmers planting them largely throughout the country. We all know how prone we are to follow in each other's footsteps. Even in a path across a meadow, we never make a straight line—every one follows the deviations his predecessors have made. It would become fashionable; it would be considered the right thing to plant trees, men of means would invest in it, and many of these, rather than wait for the growth of the young stock which alone it would be possible for governments to distribute, would go to the nurseries, secure their best stock—say their twice transplanted trees and those of foreign importation, perhaps no better than our own after all, but costing more money, in order to keep a *leetle* ahead of Farmer Jones, on the next lot, who has just planted a five-acre wind-break with government seedlings. Of course it would be necessary, in all cases of free distribution, that those supplied should bind themselves to fence properly and give good general care to for some years, the young trees they had obtained free. I am sure also that Mr. Gott will admit that such a quantity of tree-planting as he rightly considers to be necessary in order to restore, to any valuable extent, the now almost forgotten climate of Ontario, which he has so well and truthfully described, would need many more nurseries than we have at present, so that, if even one or two of these were government ones, there would be little loss to present or future private establishments, which would still raise, if not the largest number, at least the much better paying varieties of trees.

It would be well to say a word here concerning what Mr. Gott has remarked about the sowing of pine seed broadcast in the New England States on the sands near the sea shore. So far as I have seen this myself, it is done on large expanses of land near the sea—land which was once, to judge by the old stone fences carefully built round it in many parts, of considerable agricultural value. This was probably two or three hundred years ago, and the land has been cropped and cleared until it was little but a fine blowing sand, forming here and there into large whirlpools. People observing that from an occasional pine tree the falling seeds would grow without culture, sowed them themselves still more broadly, and from then till now they have been sowing them every year. It has been found that in about thirty years this produces a forest of pine trees of shortish build, but giving a considerable trunk from nine to twelve inches through. A portion of this forest will then be cut down and sold for various purposes, the chief of which seems to be the manufacture of packing boxes. Much more is sown, I believe, every year than is cut down ; the crop is perpetual, and as there is very little labor, it pays the owner. The experiment has been tried in Ontario, but without success, the seed not taking at all, though it would be well to try it in still other parts of the Province, where light, sandy expanses exist.

Mr. Gott does not consider the scope of Arbor Day work sufficiently large, but it is in accordance with the rest of our forestry efforts. Governments have neither spent nor attempted to spend as yet the large sums necessary for properly re-foresting Canada. What is being done at present may be described as an effort to influence public opinion. I think myself that some more practical measures would now be looked upon with favor by the Ontario public. The school agitation, however, has been of decided service, and may be of more. Perhaps the distribution of a number of sheets containing the rudiments of forestry among the children might be of service.

My own opinion is that the best results would be obtained if Parliament would devote more money to the object by Government either growing, say till a foot high, trees of many varieties, and giving them at that small size and at the proper season to those who would bind themselves to take good care of them, or purchasing the same, or part, from nurserymen, for the purpose of giving them out free. Those who received these little trees would find them to be far better rooted than those they could obtain in the forest. They should then devote a small plot of ground and proceed according to Mr. Gott's directions, always remembering the description of ground they are working in, and what trees they find formerly grew best there, or grow best there now:—

FRUIT GROWING AND FORESTRY.

By B. Gott, Esq., Arkona.

I wish to present this paper in its two-fold aspect of, first fruit growing, and then secondly forestry proper, and their practical inter-relation and dependence on each other. Not that I hold by any means that the former is the only department having the essential element of usefulness contained in it, to the entire exclusion of all such pretensions for the latter—far from it. As far as the essential elements of usefulness are concerned, it is thoroughly and everywhere understood that both the departments have them in very large proportions, and I might say in almost indispensable proportions. All successful nations and peoples on the entire habitable globe have felt their condition of helpless dedendence upon their tree growths as a first and fundamental condition of their very existence. As far as I know there is not a successful community of people on the earth to-day, outside the deserts of Arabia, that are permanently held together in any form of continuous being. I believe that the original constitution of society is made such by the *Great Designer of the Race*, that if any people or kindred or tongue will wantonly or recklessly injure or destroy their natural inheritance of tree growths so liberally and so generously given them, there is no other influence or power that can be made to serve to hold them together in permanence of habitation. We need only just look into the history of the past and past nations for confirmatory evidence of the weighty and solemn truth of this observation. Tree growth, therefore, and in plentiful abundance, is essentially necessary to the very existence, and fundamental to the prosperity of any people in every age and part of the world. This immense preponderating importance of a nation's tree growth is doubtless the primary reason why it is studied and treated of so much by the most profound and thoughtful of all prosperous peoples. Only witness the profound attention of old Germany and France, of England and the United States of America, in their intense and constant studies of the needs and demands of all questions relating to their national forestry. Not only is this vigilance in all forestry questions shown in occasional though elaborate newspaper articles, but exhaustive pamphlets and volumes of matter are being plentifully prepared, and as widely circulated as the demands of the nation, by the most able, scientific and practical men the nation or the age can produce. Let us further consider, and, if we can, measure the immense importance and power of those annual associations and conventions for discussion and deliberation of all questions of forestry conservation for these countries. Who can properly measure the far-reaching results of such meetings as, for instance, the American Forestry Congress, and the voluminous reports of these sent over the continent? When we consider the make-up of these conventions, and the profoundly cultivated ability and power brought to bear upon them and the questions at issue, we are made to ask in utter astonishment, "What will the future be when brought out in living forms tangible to the eye?"

But not less and nowhere behind the forestry are the fruit-growing interests of this country, now not only commanding the best ability and attention of the age, but utilizing it and emphasizing it for the highest and best ends of an industry so vastly important and fundamental to our existence as a nation and a people.

Whatever is made to favor and encourage our systematic fruit-growing interests in this country, contributing to its certainty and success, is in the truest and most practical sense helping and assisting us, and thereby so far demonstrates to us its real money value. So and for these reasons we conclusively say that

FRUIT-GROWING AND FORESTRY

are co-related and must go hand-in-hand, and cannot be put asunder but by the most evident and devastating losses to all parties concerned. It is more than needless for me to attempt to detain your readers at this late day with even an outline sketch of the marvellous strides of progress now being made, and that have been attained by our national fruit growing within the past few years. I simply wish to direct attention to and emphasize some of the needs and demands for better methods and results which I believe it quite within the range of possibility to attain by means of friendly protective tree belts around and about the fruit plantation, as well as other forest plantings in masses or blocks over the face of the country. The present position and demands of fruit-growing in this country to-day may be simply stated thus: That we are becoming more and more subject to unseasonable, high, cold and blasting winds that are destructive to the very life of every form of vegetation. These winds are not our own, nor do they originate on this side the great lakes, but on the great high mountain land of the North-West, and in their uninterrupted sweep over this country from the North-West leave their destructive influences and effects behind them. That these winds, far more common than formerly in the history of this country, not only are accompanied by great force to uproot and unroof, but also they bring with them the most intense and destructive cold analagous to that of the unprotected and treeless prairie regions of the west, that not only effectively causes to perish the annual crop of valuable fruit, but in some cases destroy even the trees themselves.

During the spring and blooming season of the year, we are often visited either by cold north-west winds or by blighting easterly rain-storms, just at the most critical period of the young fruit's life, that effectually destroy it at its birth and render the trees bare and unfruitful, all of which is directly or indirectly chargeable to want of a sufficiency of tree protection. Our rain fall is not as formerly pretty equally distributed over the whole circle of the year, but is rather in extremes and excesses at one part and at another a perfect and continued cessation, causing prolonged drouth in the heat of summer, when our fruit and fruit plants need a supply of moisture the most. In consequence of these very discouraging considerations, occasioned as I believe wholly or in part by the removal of our natural forests to an extent greater than is actually needed for economic purposes, we are annually subject to great losses in our fruit crops, causing much injury to our national industries and an immense shrinkage to the revenue of this country, If by judicious tree planting in blocks, in continuous belts over the farm or around the fruit plot or otherwise, we could successfully control those powerful influences and agents that are now apparently growing up against us, if we can direct these and so modify them in our favor we should do so, and that at once without any further delay.

These are some of the conditions, disadvantages and trials of the fruit-men in this country to-day as we see them, and our experiences are pretty large in these lines. These are some of the great and growing oppositions and drawbacks that must be met and overcome before we can even hope to make fruit growing in this country absolutely successful, or pride ourselves that we are able to put upon the market the brightest and best possible specimens of our popular national fruits. Fruit men looked up to as successful men in their profession are men who are overcoming their adverse natural conditions, and are modelling their untoward circumstances for their own ends and for their own advantages. That is, they are men of ability and power of determined will, and of a thorough fundamental, intellectual and physical training in their special lines of business, and they use these qualities in shaping and transforming their surroundings. Their precautions, prelabors and the shaping influence of all their studies are marked and very noteworthy. In the very first movement they select their location to be, as far as possible, every way favorable to the objects and purposes in hand—successful fruit-growing. They require the location to be as much as possible sheltered from prevailing destructive high or cold winds, but more especially from late spring frosts. Such locations when found are of immense value to them because they supersede the necessity of great expense in providing natural or artificial protection from these and involving much loss and time. Again, though they be well protected above from high cold winds yet the soil may be very unsuitable for their purposes by the great amount of water it holds in its composition. They at once employ an elaborate and expensive system of underdraining to render it at once suitable and favorable to the successful production of the choicest specimens of their high art. But in case the former conditions indicated do not exist or cannot be procured to their satisfaction they scruple not to plant trees around the whole plantation in belts and masses to act as shelter and wind-breaks for the fruit plants. These belts or blocks act as the conditions to modify climate, to shear the winds of their cold, and to induce the clouds to drop down their fertilizing showers. They modify those adverse influences that constantly bear upon the work and fortune of the modern fruit grower placed under frowning northern skies—those influences nevertheless that stimulate his activity and call into lively action all the forms of his inventive genius in all matters of protection and success in his chosen calling.

A Few Practical Examples

of judicious tree planting for protection, which have lately come under my personal observation, may be here acceptable.

On travelling not long since in a neighboring county near the thriving town of Thamesville, my attention was arrested by the appearance of a dark pine belt surrounding an orchard and home. My first impression was that it was beautiful, and the perfect realization of an idea I had often formed for myself as to what should be done. The trees were native white pines and stood about 10 or 15 feet apart, their dark waving branches interlacing one another and swinging gently in the summer breezes. The trees had attained a magnificent size, had run upwards about 20 feet, and I suppose had been planted about 12 or 15 years. Their dark, dense and beautiful foliage was admirable and formed a most complete and sure defence against all wild sweeping blasts that might pass that way. This belt of trees was a decided acquisition, and added very materially to the real value and working capacity of the farm as well as the enclosed orchard and household.

YET ANOTHER FINE EXAMPLE.

One of the most beautiful and extensive plantations of our hardy and accommodating evergreen trees that I had had the pleasure of seeing, was inspected by me a few weeks ago near the town of Morpeth on the Lake Erie Shore. The trees were mostly imported Norway spruce and our native white pine, but the spruce greatly predominated, especially for the whole of the inside work. They were originally planted by a gentleman owning the property there, named Mr. Hill, and had been designed not only to protect himself and the precious products of his soil from the well understood tearing winds and roaring waves of old Erie, but also to beautify and add to the natural attractiveness of the spot, in order to form a harbor there, and eventually a large and thriving business centre for trade and commerce on the bosom of the lake. This latter conception, however, he did not bring to realization, but the former is fully up to all and every sanguine expectation. Those trees stand there to-day, in their order and beautiful symmetry, as living testimonies of the designing intelligence and the far-seeing determined energy of the man who was the immediate cause of their order and beauty. The spruce had been planted 12 years ago, and were brought I was told from the United States on barges loaded for the purpose. They have now attained a height of about 15 feet and stand very closely together, viz., about 10 feet apart, and are planted inside the outside belt of white pine in all conceivable fantastic designs of plots and carriage drives, forming a piece of scenery not often witnessed on Canadian soil. Their branches are of an immense length and encouraged to grow out from the very bottom, the lowest ones lying prostrate on the ground, the higher ones overlapping them in regularly beautiful folds, shortening to the top, where there is but one aspiring shoot upward. Their beautiful dark green masses of leaf presented an impenetrable screen to all outside vision, and so being once within their friendly enclosure one would be in happy ignorance of the ungovernable elements without. They beat against it, but only to be beaten back with most resolute resistance on this, one of the most turbulent waters of the whole chain of the Canadian lakes. It was a fine place for reflection within this peaceful enclosure, so full of sermons and so full of beauty. If such astonishing results could be attained and in so short a time, think of the guilty negligence of more than three-fourths of our people in suffering their possessions to be devastated and the soil reduced to penury from year to year, never arriving at the first idea of duty in the way of protection and beauty in planting trees. They suffer, and they deserve to suffer who assist to destroy our natural wealth of forest trees and utterly refuse to plant another to replace them. I have no moral patience with men who in this way are untiring in their efforts to spread devastation and loss over this fair country, until their sufferings make them to cry out and stigmatize the benevolent Providence that is daily over their heads. I say in all honest indignation and contempt, it is a shame! If every man owning our fertile soils and enjoying the peace and plenty of this fair country, would only make a feeble attempt to do what in him lieth to replant and properly re-tree this country, how soon would it present the most attractive aspect to its now largely dissatisfied toilers. It seems to me that however loudly we may talk about our British sires and the firm and solid policies of the old land and contrast ourselves in self-satisfied congratulations with our dashing but flimsy neighbors across the lakes, yet in very truth and actual practical forms of genuine patriotism, we are nowhere in comparison with them in this matter of planting trees. I never go over into one of their cities but I stand in utter amazement at the no end beauty of their street trees. And this same form of patriotism is to be distinctly observed in every city, town and hamlet over the whole country and even over the country itself. Let us be wise and draw practical lessons of usefulness from these observations.

I went a few days ago to Mr. James Bissell's, near Thedford, Ont., to inspect a belt of native white pine he had planted about twelve years ago on the north and west sides of his garden and household buildings. The trees have grown most remarkably well and now present an unbroken front to the fierce winds coming so frequently from these boreal quarters The trees when quite young were taken from the forest and planted about ten feet apart in single row. They are now 15 feet high and are thickly supplied with branch and leaf. That gentleman told me that he considered the belt of very great advantage to him, and that he would not be willing to take a large sum of money for it, as it successfully modified the temperature to him even in the most intense cold of our winters. In addition to the comfort, they helped to save and mature his fruit, and thus he had plenty for himself and family. At the same time and near the same place I visited

THE CELEBRATED WHITE PINE BELT

on the Thomas farm, near Thedford. I had not seen this place for some time, and I was much astonished at the growth and development it had made, and so demonstrated its efficiency as a wind-break and shelter belt for the family orchard and home. The enclosure embraces about five acres, and the small white pine trees were taken about fifteen years ago from the open forest and planted closely all round the plot. The result has been a most pleasing and profitable success. The trees are to-day about 25 or 30 feet in height, and closely embracing each other in one close compact beautiful waving belt of rich sheltering foliage. During the cold and storms of winter this enclosure offers a most delightful retreat and a safe harbor against all fierce intrusions of wind or frost, and as a result the family dwell together in safety, and the home orchard and fruit gardens are generally, in their seasons, loaded with ripening fruits, rich and refreshing to the taste. Mr. Thomas says that in the coldest days of winter he can now go out with safety and comfort to perform his duties within this enclosure, whereas before it was there he could not stand out in winter to cut his wood. This is a fine example of what can be done with ordinary common native white pine, but we rather think that still better things might be achieved by the use of the best European pines or the spruces planted in systematic order.

THE JAKE ROMPH'S YOUNG PINE GROVE.

This young pine grove is a marvellous product of nature, unhelped in any way by art except the simply fencing them for protection. After the large pine timbers were removed about 20 or 25 years ago the ground was simply left alone, and this thick massive growth of beautiful pine is the result. It is located about two miles north of Thedford, and is on natural pine land on the banks of the flats or flowed lands of the Aux Sable, and embraces about 10 acres. The trees are now about 25 or 30 feet high many of them, and are a dense and beautiful mass of dark green waving pine over the whole block. It is the finest block of young pine growth I have ever seen. A prominent pump manufacturer named Dunn, I hear, has been using from this plot for some time for pump logs, and they so well suit his business that he has offered the proprietor one thousand dollars in cash for the timber on the block for these purposes. This is a fine sample of the successful and rapid growth of the common white pine, and it further shows us how short a time is required to bring these timbers into successful and paying uses, so that the outcry that "he that plants trees only plants for his heirs" is a totally fallacious and misleading one. Amid all the great variety and difference of trees in this country for forest and shade purposes, it is my opinion that we have nothing that on the whole combines so many fine points of advantage as the common white pine. Other trees, as the cedar and the hemlock and spruces, no doubt have their good qualities and fine ornamental points of great merit, and are indispensable in certain localities and positions in this great country, but for every day use, for our most exposed positions and for everybody's use everywhere there is no tree of such wide and general application as the white pine. In point of beauty, too, when near its full development, say from 30 to 50 feet high, with a full and rich equipment of branch and leaf, it strikes me that this tree is very hard to beat. Its beautiful dark rich color of leaves and their massive plenty, so cheering, so helpful and inviting as they are, softly waving in the summer breezes, and so sheltering and friendly in the fiercest winter storms, and its most useful timber for all purposes in our economy after its death, makes this tree essentially the most valuable and greatest favorite of our times. Nothing makes up for the other defects of a country or enhances its beauty and attractiveness so much as a general and plentiful plantation of white pine over its entire surface. Amongst the deciduous trees I am strongly in favor of the basswoods and the white woods of our forests for all purposes of protection and shade or wind-breaks. The rapid growth of the basswood and the tulip tree when young is most astonishing, and their beautiful color and form of leaf and its intense massiveness and attractiveness, make these two great and general favorites all over the country, on all soils and in all locations. The beauty and sweetness of the basswood in its blooming season in July is one of the most attractive things in nature, and every bee of the air as well as the living things upon the earth all feel its intense and permeating power. As a honey producer, therefore, and that of the very finest and best possible quality, every beekeeper in the land should plant in the most liberal profusion and in every possible empty space many trees of the basswood, and then follow out with a plentiful supply for variety of tulip trees.

In my humble efforts at tree growing I have been very successful at growing tulip trees from seed, in 5 or 6 years to 8 or 10 feet in height, making beautiful trees for transplanting purposes in permanent locations. The same can be done with the bass woods and ashes and catalpa. The beeches, maples and elms require a longer time as their growth is slower and more lasting. Our success with the pines and spruces have also been very encouraging indeed, and we have successfully raised a block of Scotch pine and Austrian pine to the height of 25 or 30 feet in 15 years of growth. This was as handsome and cheering a block of pine as any amateur or professional might desire to see stand on his premises. Their great hardiness, their rapid growth and their intense beauty of form and foliage make these trees exceedingly valuable in our country, and seem to fill in every particular the requisites so much desired for our uses.

But I must not forget to mention the Scotch larch as one of the most desirable of trees for belting and ornamental purposes. It is of very sure and rapid growth, and so hardy that no amount of cold or exposure can in the least affect it, and its long slender beautiful pendant branches covered wirh the most beautiful soft pea green foliage makes it one of the most desirable trees that can be employed for all ornamental or belting purposes. We planted a long row of these 10 years ago along our whole front line. That row is a most cheering and beautiful row of trees 12 feet apart and 20 feet in height, with some of their branches from 6 to 10 feet in length overhanging the road line. It is almost an evergreen, and its many fine branches, even in winter, offer quite an obstacle to the prevailing winds, and a row of these trees two tier deep would successfully serve any purpose of protection. The Scotch larch, therefore, is one of our great favorites that we recommend to all comers. These considerations to us are of vast and growing importance, since the annual plantings of fruit and orchard trees in this country is very large. indeed, amounting to many thousands of trees in orchards of from 200 to 500 each. This kind of planting is not only now very extensive but is likely to continue in the distant future for many years to come. It is our business therefore to provide at least in part for the grant wants of this future.

THE ANNUAL DEVASTATION AND DESTRUCTION OF TREES.

The naturally inherited wealth of our forests is now leaving us on a very rapid scale, and many people have even now come to the end of their allotted allowance. All over the fair face of this splendid country large and handsome block of native, erect, magnificent timbers that once beautified and served for useful purposes the broad landscape are now unfortunately not there, but are removed by the powerful elements and by the yet more powerful arm of man to satisfy his love of change and his gormandising greed of gain. This loss is a loss that is being even now felt, and we shall yet feel it more and more in our winter's cold and in our summer's heat and drought. The rapid changes in our climate that are becoming annually more apparent, and that people are now becoming so much concerned about, and of their true causes and meanings, I believe will find their true explanation only in the loss of our forests. If scientists can be depended upon and observers can be trusted, it is their united testimony that our trees are our great conservator of moisture and that they are the regulators of the winds. In the course of my short life I can most distinctly notice the great change in the composition and make up of our year. I can remember 30 or 40 years ago, that at that time when the whole of this Western Ontario was thickly studded with perhaps the noblest and most surprising growth of native trees, through whose great branches ever the eye of man peered into the heavens, that the winter's cold was not so intense, and the snow falls were far more weighty and general, and that the summer heat was tempered and the droughts were refreshed by frequent falling showers throughout the whole round of the year. Only compare our annual experience of these times with these recollections, and see the incredible changes that have taken place and that yet will still further take place in the composition of our climate, and their immense effects upon all forms of fruit and vegetable growths all over this country. These changes I believe directly attributable to the loss of our growing trees and fine native forests. The feeble efforts made to replace our trees in this country by a new and younger growth of our own planting as yet little worthy of mention. We have no regular organized system of proceedings in this matter so as to accomplish any very marked results in a work so varied and so complicated. With the meagre exception of the towns and cities over the country, the tree planting for ornamental or protective purposes is very feeble, and in no sense adequate to the actual demands. What are the assignable reasons of the lethargy and deep-seated want of interest of the people of this country in these matters? To answer this question we must no doubt consider the circumstances under which we have been placed for many years, and the necessity of removing a very large part of our primitive forest to make room for our farms and our homes. But now that this is done, and more than done, and when we consider the rapid rate at which our ordinary timber supply is being wasted, surely it is time now to consider some of the measures to be adopted by which this supply may be replenished.

The municipal laws and by-laws that have been adopted to encourage tree planting in many parts of Ontario have no doubt served a good purpose in starting the idea of tree planting amongst the people. But so far these measures have not served to produce such an extent of planting as to effect the object aimed at by them. When we look for a moment at the splendid movements in this line of our neighbors all through the western and north-western States, and at the truly wonderful results of these extensive tree plantings annually by the millions, and at the encouraging splendid growths that they are securing for these forest trees in almost unmeasured blocks we are perfectly surprised at them and ashamed of our own do-nothingness. We feel that there must be some great movement on the part of our official Minister of State and the government of this great country properly organized, and set on foot, before anything worth to speak of can be effected in this line. Mr. Ross's Arbor Day Proclamation may effect a beginning, but much more important measures will be needed to follow.

Having treated at large of the general necessities of tree planting and of some of the more apparent arguments for its encouragement and advancement in a country such as this, I would now more particularly speak of some of the plans and principles that must be adhered to in order to obtain successful results. In forming your plans for a forest tree plantation of whatever extent—it is necessary to know exactly what you are going to do and why and how you are going to do it. You are going to occupy that soil with plants that will be growing and flourishing there for many years to come, perhaps long after you yourself have done with all earthly things and cares. Therefore, it is very important that everything connected with the work should be done with the greatest care and the best possible precaution. The land itself should be well selected and of good tilth, made ready and fully prepared some time before. We would not recommend as was done a few years ago by one of the Professors of an Agricultural College, to go to the waysides and woods and take up an immense load of young trees, from 5 to 10 ft. high, and plant them in an old forest pasture by means of an old axe, making holes for them in a strong sod. Of course this was found out to be anything but successful. Forest tree planting, to be successful, cannot be done in that way. Neither would I recommend a practice we are told prevails in the older New England States, of going to the old worn out lands in many places along the sea shore and sowing broadcast evergreen tree seeds and others on those worn out soils, and leaving them to get up, struggle up and grow as best they can. Neither would I recommend the free distribution of young trees by governments, as that is an interference with private enterprise. Moreover, things got so cheaply are not likely to be well taken care of. My plan is as follows :—

Procure the best possible tree seeds from the regular dealer or collect them yourselves of all the kinds you desire to sow. Have the land you intend to use for seed beds in the very best possible condition, and let it be a light sandy, friable, rich, good loam. After the seeds are sown in the month of May, they must be shaded by using evergreen brush over the beds to protect them from the birds and from the direct rays of the sun, as the young, tender plants are very sensitive to heat and direct sun rays and need the same protection

The Parent Tree Offers the Young Seedlings.

After being grown here with all possible care for one or two years, they are removed to other and ampler grounds and planted in nursery rows, one foot by three feet, and allowed to develop themselves there for from three to five years, or until they reach a height of 5 to 7 ft., and a diameter at the base of one-half or three-quarters of an inch through for all deciduous sorts. Of course evergreens will assume different forms of growth, and to get them up they must be planted at first quite thickly in the rows. It will be found very surprising how much can be done in this and similar ways in raising tree seedlings nice and fit for general planting. Even young people can experiment in this way on a small scale and raise all the tree seedlings they may need for the farm in small plots in the garden devoted to these purposes, and many very fine and beautiful trees will be the result, that can be used for protection and further beautifying and ornamenting and enhancing the value of the farm.

I would not dare to attempt for a moment to offer minute directions in detail for the production of forest trees in large quantities to professional or old practical growers, but for the further information of others who are not so I may beg to offer the following observations: Trees grown in nurseries, in ordinary nursery rows, say three feet by one, will include 14,550 to the acre, and will be found to be so much superior in every way to forest tree seedlings freshly removed from the woods as to amply pay all the expenses of youthful culture. They will have better roots and rootlets, better bodies, and by far better tops, and will, in consequence of this early, wise and judicious treatment, in the open ground make altogether better trees and in far shorter time. I would therefore greatly prefer them even at a greater first outlay of cost. The next important consideration in the matter is about the plans and methods to be adopted for permanent plantations, and these will be found to greatly differ according to the ultimate designs intended to be reached. These designs may be classed under the three following heads: I. Forest-mass planting; II. Belt or wind-break planting; and III. Ornamental or beautifying planting properly so considered. I will try to deal with each of these methods of planting and as briefly as possible.

I. Forest Mass Planting.

I will suppose the ground to be well and carefully selected, rich, and an ordinarily good productive soil, the nature of which may vary as well as the extent of the surface to be covered, from one to twenty-five or even fifty acres. This ground must be thoroughly well tilled and friable, not too wet or too dry, and in every way good condition to be planted in the spring of the year and as early as possible. After taking the proper bearings of the piece it will be well to lay it out so that it can be planted in long straight rows three feet apart in every direction, so as to include 4,840 trees to the acre. The trees I would prefer young, and not too large, say from four to six years, according to the kinds used, to facilitate as much as possible the work of planting. This work may be done by means of an ordinary spade, one man making the holes to fill the others up as the other man places and holds the trees in proper position. Two men in this way will plant from five hundred to one thousand trees in a day by using diligence and skill in their manner and work. Perhaps it will be objected that this distance for the trees mentioned will be too close together, but it will be found of great practical advantage in actual culture in keeping the ground cool and moist and free from weeds, and also in urging the young trees upward instead of making so many side branches. After a term of years and the young trees have grown much so that they are now crowding each other too strong, the whole block may be gone over and take out every other tree in every row so that they now alternate and leave the spaces six feet apart to every direction or 1,210 trees to the acre. The remaining 3,630 trees taken out will be utilized for binding poles, hoops, withs, and several other purposes. After a longer time another thinning may take place until the trees are finally left about 30 feet apart, or 50 trees to the acre; but this arrangement may not at all engage the attention of the original planter. The questions of culture and pruning, etc., may depend upon circumstances and may be more or less as interest and disposition may dictate, but in all cases we would most decidedly be in favor of indefatigable attention and culture during all the younger years of the life of the trees. It will help to make better and thriftier trees, healthier and better rooted, and, in short, it will pay. These blocks of beautiful young forest trees of either walnuts or butternuts, or hickory or chestnuts, or basswood or tulip trees, or ashes, elms or maples, or mixtures of all these in certain proportions, we do most earnestly hope to see established over the face of this country to greatly add to its native beauty and to its still greater intrinsic worth. Who would like to see their country degenerating into a great waste desert, or even into a bleak, open prairie like those treeless regions of the great North-west? We are as naturally bound to our trees as the heart of a child to its home, and can no more easily bear the thought of living without them. A young man of our acquaintance leaving this interesting country went away west to settle on the open plains of the Dakotas. After passing some six or eight years there and the sight grown unfamiliar to the pleasing contour of his home trees, he was induced to travel on an excursion about fifty miles from the point where he was to see the broad Missouri river and its richly tree-planted valley in their beautiful proportions. The thing that took his attention first and most was not the broad, calm waters of the river or its majestic flow or its astonishing and awe-inspiring length, but the trees bordering it and filling its valley. He exclaimed, "How beautiful those trees appear! I think I should never tire to look upon them. They remind me of the beautiful forests of our native Ontario, and I have seen nothing like these since I left home." This no doubt an index to the feeling that attaches every native of Ontario to his forests and his native trees.

II. BELT OR WIND-BREAK PLANTING.

This form of tree planting will also greatly depend in its extent and form upon the ultimate designs or plans of operation. If the belt is intended merely for protective objects and is made to include the orchard or the garden or the dwelling for the family, or a small block of ground for other purposes, then the plan of operation is very easily determined. Good wind-breaks may be formed by using evergreens and placing them round the block at distances of six to ten feet apart, or better, at distances of ten to twelve feet, and double the row so as to break spaces. This will no doubt make a cheap and very efficient belt for the purposes designed. It will be found better also to give some protection to those young trees and considerable culture and training while they are young, otherwise their form may be injured and their growth retarded to a very serious extent. A very efficient and handsome belt may be made by taking a wider piece of ground, say three or four rods around the piece to be enclosed, and planting high-growing, deciduous trees on the outside and then nearer to the centre high-growing evergreens and lower growing deciduous trees and lower evergreens, and so on, till the allotted space is filled. This is a faint effort, as the two objects to be aimed at, viz., the ornamental and the useful, which, of course, is not an objectionable combination. Belts again may be planted even without much design of plan around any particular field, or even around the whole farm, by placing trees along the lines and divisions, ultimately to grow up to large trees; and they will be found to be very useful and add very much to the real value of the farm.

III. ORNAMENTAL OR BEAUTIFYING PLANTING.

In this department I shall not descend to particulars either in operation or description, inasmuch as it falls directly within the province and art of the *Landscape Gardener*, who, as a general instructor, must be consulted in all matters pertaining to it. But still, lest some should by this remark be discouraged from all attempts in this direction, I may be allowed to say that so much is now being published not only upon this special matter, but also upon all ordinary matters pertaining to the farm and its improvement, that any ordinary person of ordinary intelligence and skill may in a very short time pick up much that will be useful to him and enable him to do things that could not be thought of a few years ago. I would say then, let none be discouraged by any means, for if you have not the means or are not disposed to hire a first-class, professional gardener when you want to plant trees, use your own acquirements and do it yourself; you will learn much as you go along. The size, location and general surroundings of the block will serve to guide you much and the general effect which you intend to attain must also be consulted.

ARTICLE ON EXISTING PLANTATIONS IN CANADA.

By T. M. Grover, Esq., Norwood.

Our readers are here given the statements of a gentleman who can speak well as to the results of plantation in Ontario, he having established, and now for some years cultivated one of the largest private plantations of forest trees in the country. It is of great value for this reason, that the writer does not disguise from us that he has had several failures as well as many gratifying successes. Concerning his failures, he gives us frankly the reason that in some places the trees were not suited to that part of the country; and in others the land or the subsequent care of the plants were not precisely what they should have been. On the whole, however, his experiences are very encouraging, and give valuable warnings to those in that part of the country as to what trees they may safely plant or not. When once a number of these plantations begin to stud our land, and those young trees, which are valuable when only six or eight inches through, begin to sell, there will be planters enough, and many will regret that the intervening time was wasted—that they did not in fact plant now. I have repeatedly laid before my readers statements from the owners of large wood-working manufactories to the effect that they would often be glad of the opportunity of purchasing large quantities of young timber of this class. One firm near Kingston I remember saying that a hundred acres covered with young hickory would be more valuable than all the crops produced by several adjacent townships. My readers, who may have observed the slow progress made in growth by a hickory, ash or other tree growing in the open, would find these trees if grown in plantations of a good size, say an acre, grow in quite a different fashion. Let us plant them say at four feet apart each way so as to give space for cultivation for a couple of years to keep down weeds, and they will grow up tall and with few branches, giving long straight sticks, pretty clear of knots, and yielding far more valuable timber than could possibly be cut from any natural hardwood forest. Of course, after a number of years, these will need thinning out, and by that time in most regions of Ontario, even the thinnings will be valuable.

Mr. Grover does not approve of the attempt to raise trees from seed in Ontario, thinking they had better be imported from foreign or bought from our own nurserymen, and rather doubts that in case of the conifers, they can be successfully raised to any profit by amateurs at all. In actual practice, however, we find this different. Captain Twohy, of Hamilton, having some leisure, amused himself three or four years ago by raising in his own garden 350,000 fine plants of the Norway Spruce, as difficult a conifer, perhaps, as there is to raise from seed. Of course this involved the necessity of complete shelter and proper supplies of fresh air and water at necessary intervals. As to the general amount of tree seeds sown through the country, it should be remembered that it is not always the strong men in the family who are likely to busy themselves with seed sowing. In many cases I have known it was the old man, the owner of the farm, who, too weak now for active labour, found employment and amusement both in raising from the seed tiny rows of plants, and also transplanting them when ready into a nursery bed, and then again in the places where they were ultimately to stand.

Mr. Grover has had difficulty, it appears, with the nut-bearing trees, especially with walnuts, but has not got into the right track. Let me repeat what has been stated in most of my reports, that these had better be kept through the winter in heaps covered with litter or in sand made occasionally damp. Many of them will sprout in spring, and these, properly planted, are generally a success. I may remark here that I have known walnuts brought from Kentucky most successful in germinating near the lakes.

In another communication Mr. Grover makes the valuable remark that, "There are many good farms in every county in Ontario in the posssession of old people, of females, of trusteee and of tenants, and of which proper profitable cultivation is not possible at all times, but which would steadily increase in value if part was planted to timber, and at a future day would be of greater value than all the income that could be derived from it in the meantime. Forestry is a science; we have not come to that yet. The relation of each tree to the whole forest. the shade-enduring and the light-needing, the rapid-maturing trees, the nurse trees, the short lived-trees, the study of a century of growth, survival, influence of each variety on the other and on the soil—in fact the whole subject of national forestry—will soon call for ardent students, and every step on the way will, we hope, be of profit and encouragement to the individual and to the country."

Mr. Grover goes on to say:—

SEEDLINGS OF MY OWN RAISING.

An evergreen seed-bed I found a great trouble and a practical failure, and the idea of suggesting the raising of any conifers from seed by beginners particularly unfortunate. In this climate the unusually tender seedling of all conifers requires protection varying daily, the little transparent shoot less than an inch high will wither in one day's sun, or will rot or damp off in two days rain, and from birds and mice a wall must be provided to protect them. I find nurserymen in Canada generally avoid planting evergreen seeds, and many prefer to let the seed of all the trees alone. In the moist open air of France and Scotland there is no such trouble as we find here. When the business is done on a large scale shelter, proper soils, ventilation and proper supervision can be given to millions of plants as easily as to a hundred.

My seed-beds were never entire failures, and if I followed up seed planting I think I could obviate most of the difficulties and no one need hesitate to try it for the purpose of experiment, even if there is a cheaper way of getting the trees.

I sowed in the fall of 1886 and in the spring of 1887 all common varieties of tree seeds, and at this time the best of them being now three years old, they are about as follows:

Black walnut	4	feet.
White ash	5	"
Yellow locust	8	"
Mulberry	4	"
Soft maple	4	"

Conifers:

Larch	12	inches
Scotch pine	9	"
White pine	7	"
Norway spruce	5	"

The catalpa, mulberry and locusts are of doubful hardiness, especially the first year or two, and a careful selection of northern grown seed is indispensable. The locust must in all cases be covered the first winter, in fact taken up and stored or most of one year's growth will be lost, and for want of this the size of my best trees is not a criterion of what three year's growth should be in this climate. The mulberry is not really suited to planting in this climate, although it does succeed in as severe latitudes; the seedlings are uncertain—one may be hardy and the next tender, and it may well be left out of the list of trees desirable for us.

IMPORTED SEEDLINGS.

A good many trees of all varieties and from several of the largest American nurseries have been set out each year both in close rows and in the plantation. I found a good deal of trouble in both systems, although small seedlings can be bought for fifty cents per thousand and a bushel of ash seed for one dollar, yet for the sake of a thousand good trees obtainable freely "Two year transplanted" at from three to ten dollars per thousand, it will not pay to prepare land, plant the seed or seedling, hoe, cultivate, and transplant at a busy time; in fact it is worth the nursery price to dig and sort them, and the whole of such work is much better left to large establishments where skilled men plant and dig by machinery at just the right time, sort into sizes (for like vegetables no two of the same planting will be alike), count, store and ship in lots more easily than I could do any one of the operations. My experience is that the amateur planter can well do, as I find our small Canadian nurserymen prefer to do, buy what few trees they need from those whose business is so large that the items are very small. In many cases they will ask but one dollar per hundred, and for a thousand one and-a-half dollars! The small price asked need not lead us to think that all our American friends will send us only wild seedlings pulled out of some wood or marsh near them. They say there are some who do—but the responsible nurseries do not need to do so, and I can bear witness to their general care and responsibility, their interest on small orders, as well as large, and very often their promptness to replace failures, not always traceable to them.

SEEDLINGS' CULTIVATED.

Now for two or three years show a growth as follows:

Black walnut,....................	3 years growth,	3 feet.
White oak,....................	"	5 "
American elm....................	"	5 "
Box elder....................	"	8 "
Silver maple....................	"	4 "
Norway spruce....................	"	3 "

At the same time many walnuts and nearly all the catalpa, sycamore, mulberry, coffee trees, and larch, though doing well, do not make a great yearly increase in height. The removal of all except the maple, elm and ash, seems to retard the growth for a whole season, in all sizes of the tree, and this must not be overlooked in planting any large number of trees.

NATIVE SEEDS AND SEEDLINGS.

My experience is that three years' additional growth will add to small seedlings as follows:

Sugar maple..............................	3 feet.
Soft maple..............................	3 "
Basswood..............................	4 "
Black cherry..............................	4 "
Elm..............................	5 "
Black ash..............................	3 "
Oaks..............................	2 "
Cedar..............................	2 "
Tamarac..............................	2 "

It will not take half-an hour in many of our woods to gather 500 seedlings of any of these varieties, except oak. They are so easily and safely removed and so sure to grow rapidly, that it is a pity people who want to plant trees will always leave it till the last minute, and be obliged to take a crooked stick because it is the right size.

The oak is a greatly neglected tree, partly from the impression that it is a slow growing tree, and also that it is hard to transplant, both of which ideas are now contradicted by leading nurserymen in the United States. The acorns are more easily got than seedlings, and very certain to grow, and the seedling so very tough and with such a firm root, that it is a most satisfactory tree for planting, whatever may be its possibilities for profit. Plenty of seedlings of the black oak can be found, and I believe it will grow on dry sand where it will be hard to make other trees survive.

PLANTATIONS.

Simple as it seems to have a field prepared about as for wheat, and mark it out for planting 4x4 feet, and being supplied with seedlings from a nursery, send a man and a boy to plant two or three acres a day, then to care for it as we would for corn for a couple of years, I venture to say that persons without previous experience will find it rather more easy to fail than to succeed, and with the best care there are inconveniences if not difficulties.

I found the named seedlings came to me in bundles, but were mostly about the size of a knitting needle, and at four feet apart, it was hard to follow the row with the eye, especially white ash, which often will not show a leaf till they are six weeks planted. Another lot of seedlings came duly, but the bundles had broken apart, and I could not then tell ash from elm or buckthorn, and could only put them in nursery rows till they developed. One lot of ash proved not hardy and froze off to the ground every winter.

I think for beginners too, one variety of a tree at a time is enough, for there is no particular object in providing other kinds at intervals to be cut out, leaving the main stock only to mature. For instance: a lot all white ash will be more even and easily looked after than if mixed with slower or faster growing trees.

LARGE SEEDLINGS.

For every practical purpose of forest planting here, I recommend, for the inexperienced, the use of large or two year old seedlings only, which will be about the size of a riding whip, and for the first block stick to one variety. I would not limit a nurseryman or gardener experienced in handling trees to size or variety however, for the little seedling will grow all right, and, no doubt, a proper forest growth is best attained and only perfect in a mixed plantation. There is no object in getting the smaller seedling because it is cheap, and trying to develop it in a nursery for a year or two. The labor of planting any seedling is greater than the wholesale cost, and to plant, cultivate, transplant, and set out again for the sake of three dollars a thousand, is loss both of time and money. Where the seedlings of common forest trees, ash, elm, maple, cherry, and the like, are sold at one to two dollars per thousand, the price asked for two years transplanted of the same variety will be from five to six dollars. The only real difference is in the cost of handling, the two year trees always having a root requiring a hole to be dug, when the small seedling will not need more than the work of the spade. I did not find the two year old any more difficult to establish, and the time saved is encouraging.

OTHER FAILURES.

If I have met some small disappointments, I have many reasons to feel encouraged when I read of the plantation of Mr. B. Landreth, in Virginia. This gentleman, who is the large dealer in seeds in Philadelphia, some eighteen years ago, undertook to establish 5,000 acres of forest in Eastern Virginia. If that had been successful it would have been a noble forest to-day, but Mr. Landreth was obliged to report at the last American Forestry Congress, that the plantation was a practical failure, although I have no doubt he had employed all the skill and forestry experience available for material, as well as the work. The walnut is a grand tree in the native forest in that region, but made feeble and uncertain growth when cultivated. The pines and other conifers refused to grow. The nuts planted, and the seedlings of other nut-bearing trees, were injured by rats, squirrels and cattle. The locust, of which at one time he had a fine block of over fifty acres grown to a good height and with interlacing branches, which shaded the ground and averaged six or eight inches in diameter, were destroyed in one year by the borer, and it cost him quite a sum to get rid of the stumps, and as a final result, only two trees can be said to have succeeded at all—the catalpa and one of the hardier spruces—yet the owners intend still to prosecute the work. It may be the protection of a few good trees; or a different system will give the necessary experience to insure the success of this most interesting attempt at the very work we are all talking of. The failure there of trees which seemed to grow so well in the nearest forest, is remarkable, especially as further west in the same latitude, but in a drier situation, in Southern Ohio, all the same trees seemed to do so well. There seems to be little trouble here, in Canada, in raising any tree that will endure our winter. Some of our most careful planters tell me the sugar maple is very uncertain and a slow grower when transplanted; but I have not known many of them planted when of the seedling size, and, of course, larger trees are always uncertain. In my own little nursery, all our wild seedlings grow easily; maple, perhaps, a little slow, but nearly always successful, and when once really established, seems a very durable tree.

SUCCESSFUL PLANTING.

In the case of trees requiring some exact experience, perhaps in every locality it will be necessary to make a trial before we can say just what variety will succeed best The result of my planting so far, is that I can now feel confidence in planting any number of the following trees in the ordinary farm land of the central counties of Ontario, and I mean generally the ordinary seedlings most readily obtainable from nurseries.

White ash, black ash, box elder, black cherry, white elm, rock elm, yellow locust, sugar maple, catalpa, basswood, cotton wood, Scotch pine and white cedar; with more care, the black walnut, white oak, hickory, spruce and white pine, are easily established, but are a little slower to grow and do not so easily keep out of reach of the weeds.

I mean such planting to be ordinary cultivation only; without any watering, mulching or protecting, in fact, not more care than could be given to a plantation of any size one wished to establish, and with sufficient attention to keep down all weeds.

In Scotland and the north of Europe, where many forests are being planted, the climate is so very different that trees are more easily established. They can make the Scotch pine grow by simply cutting a cross in the sod and turning back the corners and sticking in the seedling, and the sun is never hot enough to wilt it. The pines and all other conifers here, either require, or at least are greatly benefited by a covering of any kind the first year, and to be planted firmly in a moist soil; the drying of the roots either in transportation or planting, being especially injurious.

The choice of variety of our ordinary deciduous trees is not at all material to the success of the plantation. We may be influenced only by rapidity of gowth if that is an object above all things or the ultimate value of the timber the mature trees will furnish for sale, or the greatest amount of protection from sun and wind, that will be furnished in a short time.

The white ash seems particularly adapted for general planting here, and is my first favourite if I was required to choose. The firmness of the wood and bark and clean straight growth, are attractive at all times, and its quick growth and usefulness at all ages are well known. The seedling of box elder resembles it very much, but while young it branches and suckers too freely, and I am told the mature tree in the west resembles a big apple tree more than a forest tree, but it is a very handsome and useful tree, and so cheap and easily planted that it will be long before we have too many.

The black cherry is good in every way, and a very rapid grower, but is sure to be stripped by the caterpillar. I don't know whether the tree would suffer in the middle of a thick grove. The cherry is said to grow twice as fast as walnut, and will endure being planted much more closely.

None of our native trees, when of good size, grow faster than the rock elm, and it is always a valuable wood; it is not quite so handsome as the white elm, but all the elms are so liable to the attack of the leaf beetle, that it is not now so generally planted.

The locust does not seem to suffer so much from the borer here as it does further south, and as it grows so rapidly, and is said to be as good firewood as maple, and better than cedar for fence posts, as well as useful for manufacturing purposes, it seems a most desirable tree for trial generally.

ONE VARIETY ONLY.

While arboriculture is experimental, I strongly advise the planting of only one kind of tree on a plantation. There are so great variations in development in different soils, that unless in the hands of an experienced planter the growth will be very uneven—one tree might do well where another will hardly hold its own, when under proper circumstances they would do very well together. A small lot of all ash, or all cherry, or all maple, will furnish a greater return and a better test than if all were mixed. I do not speak here of a proper extended planting under skilled management, where, of course, all kinds may do well, but of small lots under the management of those unacquainted with the trees and their growth in detail.

FOREST SEEDLINGS NOT SOLD

by Canadian nurserymen as yet, must be got in the United States. Many advertise in the common agricultural and horticultural papers, and an order for one or two dollars is filled just as carefully as any large one, and as prices in all cases are quoted at wholesale rates, and the stock carefully packed, and no duty, neither price nor distance need hinder us planting trees.

PRESERVATION OF WOOD LOTS.

While so much has been said to encourage tree planting by farmers and owners, the care of the remaining trees on the farms should first have our attention in the interest of forestry. That a few trees, irregularly growing on nearly all our farms are evidence of some thought on the subject, yet that no wood lots have been effectually preserved, at least I know of none, is a matter of regret to every student of forestry. We have one block of 100 acres of fine hardwood bush of nearly all old trees, so effectually pastured by cattle that it would be impossible to find one tree small enough for a handspike in the whole of it. The large timber nearly shades the ground, and every spring the whole surface is covered with a growth of seedlings of three or four inches in height and including every variety of native tree, but destined to afford only a poor pasture for wandering cows.

Another small block has been enclosed for about ten years, and for many acres on the south and east is already densely wooded and almost impenetrable; many maples, elms, basswoods and cherries are now ten or fifteen feet high and will soon be the best forest left.

Another block now four years fenced in with the ploughed land is entirely covered with an undergrowth from two to six feet high, and if it can be preserved long enough these will replace the matured or maturing trees now fast passing into decline and decay. Farmers should realize the little good of the pasture of the forest undergrowth, one acre of mixed grasses really affording more feed than twenty acres shaded bush land. Since the introduction of wire fencing it is easy enough to fence off the portion of bush desired to be preserved (do not twist the wires round the trees, but fasten them to a slat nailed against them); this will preserve the bush, and it is very dear beef that is grown by spoiling a good bush lot. In all my wood land, more or less isolated blocks, the number of old trees which are already dead at the top would astonish any one who counted them. I am led to believe that the preservation of a native forest requires more knowledge of the principles of forestry in theory and practice than a new plantation. Professor Fernow, Director of Forestry in the United States, seems to say the same. A cutting out of the matured trees may or may not be proper—a thinning of any kind or of any proportion of the surface of the land may or may not tend to the best development of the whole. The extension of the grove by outside planting, and in fact any effort to make it a permanent forest, will tax the best skilled forester. Cases are mentioned where the cutting out of an inferior kind of wood, as of rough swamp elm, has so deprived the good growing trees of the needed protection from sun and wind that the result was soon seen to be disastrous. A clearing out of old logs and undergrowth, as practised in a park, would be ruin; the ground needs the mulch of wood and leaves above all things; in fact without the aid of science protection is the only thing that can be recommended.

THE STUDY OF FORESTRY.

Any person giving attention either to the growing forests or to the forests now being cut away will soon feel there is a good deal to learn. Few in Canada are aware that there is a science of forestry and that books have been written and generations of men trained to develop forestry in its minutest details. That each variety of tree must be cared for in special manner—each requires in a different degree light, shade, moisture and protection, by its own kind or by others. The period of maturity of each is varying as well as the further duration or rapid decline. After this the effect of forestation on the adjacent land and on the climate and health of the region will be of interest to the observer and of profit to the community.

On the Otonabee River, where most of the pine was removed about forty years since, one block of 200 acres had been kept untouched till last year. No doubt the owner had his own trouble to resist the offers of lumbermen to cut that in almost every year; it was on the bank of the river and convenient in every way. Two or three years since, the gradual deterioration as well as the slight growth of the trees became very noticeable, and it was evident it must soon be cut to save it, and the owner then sold it at fifty dollars per acre for the pine alone. If carefully and scientifically examined, I have little doubt it would have been found to contain more sound wood a few years before, and it is, I think, a good illustration on the subject of forest preservation.

Lumbermen's Forest Lore.

The clearing of our forests, now almost entire in the settled parts of Ontario, will soon drive the lumbermen entirely to the north and with them a large experience and skill in one branch of forestry will disappear—I mean economic forestry, or how to make money out of trees. It will take a wood ranger many years to be able to go through a forest, and by counting the trees he can identify without changing his stand to say how many merchantable trees that grove can be depended upon per acre he can also tell by clasping his arms about the trunk; if the tree will yield a piece of timber a foot square or not. I think this kind of knowledge is limited more or less to America, and that a German or other trained forester would rather make exact measurement and calculations, and I doubt if he would be as nearly correct.

An old lumberman, my neighbor, has at times said to me, " There are three rock elms and one black birch in your woods that make timber, what will you take for them ? " When I must admit that it would take me weeks to find them on a diligent search, a life long experience with woods must it is clear, give a knowledge of the subject which no scientific training can equal.

Forest Literature.

The student of forestry will find that the subject has been well discussed in the present and in past writings. Apart from botanical works there is a whole literature of American Forestry as well as European. A new periodical, *Garden and Forest*, gives us the latest and best views of practical tree planting and forestry. *Fuller's Practical Forestry* and *Hough's Practical Forestry* are useful American treatises and good practical instruction and general information are found in Mr. Phipps' reports to the Ontario Government. General Brisbin, A.S.A., has lately written, "Trees and tree planting," evincing an interest in the subject, M. H. Egleston, hand book of tree planting; Geo. Pinney, Culture of Forest Trees; and the forestry reports of the American Government will be found of great interest, especially those for 1884, 1886 and 1888.

Natural Forestry.

The general work attempted by some foreign governments is of great interest to many students of forestry, especially the efforts made in the United States where the conditions are so similar to our own. The surveys there made and the estimates of the existing forests are of little value—it is almost impossible to say the existing forest of a locality will be used up at a fixed time, or to judge of the future use by any estimate based on the past. In New Hampshire the entire removal of the pine was predicted for a time now past, though they are still lumbering there. It is quite true they are now cutting into boards pine trees of four inches in diameter, but I take it this is evidence of more difficulty in transportation to that particular point than of the end of lumbering operations in the State. On the Pacific coast the lumbering was long confined to land on floatable water, and there may be lumber exported there long after its apparent supply is ended.

But the survey and investigations are a necessary part of the subject as well as the planting of new forests and the condition of the prairie region.

The schools of forestry in Germany and England, the forest regulations and development of India, the study of the use and durability of woods as applied in the construction of railways and in the arts and manufactures of the country are a necessary study for Canadians hoping to adopt any forest policy in the lands we are interested in, and the application of any part of a forest policy before it is too late must be undertaken now, while we can still study the old and establish the new forest at the same time.

That reforestation on good land will not be profitable is no standard by which to fix the forest policy of a country, but the results of plantations in Europe and in the east, and the protection and well regulated sale of the timber in Indian forests (Hindostan) judged by the timber alone and disregarding all scientific and theoretic benefits of forests, are sure to encourage every community in America to admit the propriety of, if not to adopt a system so earnestly to be desired.

ON PLANTING TREES AND HOW TO GROW THEM.

By J McP. Ross.

If those who receive this report will carefully read the following article by Mr. Ross, (and it would be all the better, unless they possess specially good memories, that they should read it once or twice over again) they will find much to admire in the clear and easy style in which it is written and much of profit in the valuable instruction given. It is not, they will notice, written in anything like dictionary form; here and there they will find a piece of instruction well worth remembering, here and there a reflection equally so. Mr. Ross has had, as he tells us, twenty-seven years' experience in practical tree growing, and also the great advantage of passing much of that time under the supervision of one of the oldest and best planters in Ontario, Mr. George Leslie. During that time, of course, he has had many opportunities of observing both the failure and the success of different plans, and it may be observed that he says little or nothing of failures now, knowing, apparently, well how to avoid them. But one point concerning this should be particularly noticed, that is that without proper care both in the preparation of the ground, the planting of the tree, the time for planting and the keeping the ground free from weeds afterwards, he appears to consider that failure might very well result.

Mr. Ross mentions the large forests of pines and other evergreens which we still possess. But these, unfortunately, lie mostly to the north and east of cultivated Ontario, while to give their principal climatic benefit, the condensation of clouds, production of seasonable showers, and restoration in fact, of our former Canadian climate, they should be to the south and west. To these positions, of course, we cannot restore their former pine forests, or the great hardwood forests once intermixed with them. The land was rich and needed for agriculture, and has mostly long been cleared. What we can principally do in this matter is, throughout older Ontario, to preserve what still standing forest we may, to clothe with trees our thousands of barren hillsides, to plant where needed a wind-break, where possible a good plantation, and we may then hope to experience the once pleasant and fruitful climate of Ontario again. More of this planting is, in fact, being commenced of late years than my readers might fancy. but very much more is necessary.

Another point Mr. Ross notices is worthy of particular attention. For want of its observance I have known weeks of labour and whole seasons of time completely thrown away, that is to say, the keeping of the roots of evergreens in a moist condition from the time they are drawn or dug from the forest bed or nursery plantation till they are safely planted. The best way in which I have known this accomplished is having the waggon close by, putting the trees in with a considerable lean backwards, and packing plenty of damp moss, or something of the sort where that is not obtainable, round each root, having a large tarpaulin or canvass lying loosely over what you have packed in, and when your load is complete tying it over the whole. I remember bare fields near Toronto, of some acres in extent, which were planted in this manner. Not a tree was lost and they are now beautiful little pine forests, I should think over sixty feet,in height.

It may be also useful to remark that it is better,unless taken very young, not to take young pines from a very deep sandy soil, as their roots will be very slender and so deep as hardly to be taken up without breaking.

With reference to Mr. Ross's suggestion of a thick border of trees round each field, I should rather approve of his other plan, namely, a good plantation to each farm, so placed as best to shelter it. One thing is certain, however that if Ontario is to be, instead of a wheat-growing country, a grazing and fruit-growing one, we must again have our former rich crops ot grass, and we cannot do so without we plant many more trees :—

PLANTING TREES.

By J. McP. Ross, Esq.

Looking back on an observant period of twenty-seven years practical tree growing the writer has many things to regret. The greatest regret of all is, however, disparaging, as they are commonly called, tree pedlars : and advising or discouraging people and acquaintances generally from patronizing the class as a whole. Why ? Because the writer was aware of the many frauds and impositions practiced upon the guileless public by the unscrupulous pedlars, as he then thought them to be, and also influenced by nurserymen's sayings and writers generally on tree subjects, against them.

Now I very much regret ever having any animus against them, for had it not been for their zeal, overzeal, enterprise and cheek, or whatever you may like to call it, many places now blooming like the rose would have been as barren almost as the sandiest place in the Sahara desert. To plant a tree is a benefaction to the public—to make it grow shows care and observation on the planter's part, and is deserving of great credit—but to induce a person to plant who would never have thought of it at all, no matter what it is they plant, whether hedge or shelter belt, pine or fruit tree, flowering shrub or rhubarb plant, is a good action, and whether the reward is in his own satisfaction or is a highly remunerative one it does not matter, for future generations should rise and call him or them blessed.

Then all honor to that abused class for the good work they are doing, no matter where they come from or of what nationality, whether Dutch, Yankee or Canadian, let them sell to the public in all the length and breadth of the land. But now we must say do not do it unscrupulously—do not sell a man a magnolia where a horse chestnut will not thrive, but do your business intelligently ; learn the business, tell the farmer or the planter what trees may and would thrive, tell him what is best to plant at the present time on his soil, on his location, and in his particular latitude.

I know the blame often falls on a tree agent from the carelessness and neglect of the planters themselves, who will not give the attention necessary to success.

Careless planters are numerous and mischievous, for, by relating their bad luck, they often discourage careful people from planting, who would have been successful had they attempted it.

Before going into my main subject let me say a word of praise without vanity or flattery, all honor *Firstly*, to that government that recogizes the *vital* importance to the country of tree planting and diffuses such information as will stimulate and direct farmers to grow successfully fruit trees for their gardens and forest trees for their woods, whether evergreen or deciduous, either native or imported, that will give beauty to the landscape, moderation to the climate, shelter for their cattle and crops, wood for their firesides, and refreshing shade on roadside and in the field to the friend and the stranger. *Secondly*, to those enthusiastic gentlemen, whether professional or private citizens who, having the love of the beautiful and the useful in their hearts, do all they can by voice, pen and example in giving the benefit of their experience and observation to the public at large. But here a thought, is it not a gratifying pleasure at all times and in all seasons to the person who plants, to watch the growth from the tiny seed or cutting—from plant age to massive tree—to view with complacency in old age as Downing states " Those leafy monarchs, planted by his boyish hands and nurtured by him in his youthful years, which have grown aged and venerable along with him—

> A wood coeval with himself he sees,
> And loves his own contemporary trees."

And now to our prime subject and the title of this article. I can point out this fact to any observant farmer or gardener or to any intelligent person, that nature *always* provides some expeditious method for the rapid reproduction of the species and particularly of the vegetable kingdom. Say first from seeds, second from cuttings, third from layers, and if not rapidly from either, at least from divisions of roots or green cuttings rooted artificially under glass. But fortunately for us, our principal valued forest trees grow freely without any difficulty and do not require any great skill, but the slightest observation and care. CARE, *care*, we must repeat, is everything. Everyone knows what results are gained in any business no matter what it is from the form of attention given it, and we can only utter the truism, *i.e.*, the best care gives the best results.

I hardly know what class of trees first to take up to give special importance to, but will rapidly glance at them all. We notice, however, that the old trees or varieties say grown twenty years ago are the leading ones yet, and although new ones are occasionally introduced they do not stand, say my twenty year test. So I will fall back on my old acquaintances in the following order. Nut trees ripening in the fall in their care and attention : Oaks, walnut, butternut, horse, and sweet chestnuts grow easily and freely from the nuts gathered as soon as ripe in the fall and sown at once; hickory and the beech also grow freely, but are a little more impatient of transplanting; all taprooted trees are more or less so difficult.

Two methods can be adopted to grow them successfully, first to cut the tap root in the seed bed the first year, leaving the plant undisturbed either by spade or other sharp instrument; second, to bend the tap root in the space where the second planting is to grow permanently, and soft growing trees like the horse chestnut or butternut may remain two or three years in the seed bed, then being dug up can be assorted in two or more sizes, should be neatly trimmed to six or seven inches of root length and tied in convenient bundles for transplanting. The hickory is the most shy, but even it is easily grown when the tap root is cut in the bed, or as we say, semi-transplanted.

IN THE SEED BED

As before saying, sow the nuts of all kinds of nutbearing trees, as soon as possible after gathering—in good, rich garden soil, of deep tilth, in drills 18 inches apart, and in the drills say from 4 to 6 inches in depth. Have seed bed well drained, the soil on top anyway. A sandy loam that will not upheave by frost and when covering the soil evenly, tread it firmly, for, as an old gardener says, the foot is a better gardener than the hand. Do not neglect the tramping and finally, but most important, cover the bed with a good covering of manure, leaves or any other substance that will retain the soil and keep from exposure to wind or sun till the growing season commences. Carefully examine the bed now and then to observe when any signs of growth appear—then remove the mulch or covering, but not before. I may say the whole secret in growing nuts or other seeds sown in fall lies in the importance of thorough mulching. This also applies to the growing of plums, cherries and peaches from the pits or seed. Peaches are generally cracked by hand with nutcrackers and the kernels and shells left mixed in sand in some cool cellar till sowing time arrives If not practicable to sow the nuts in the fall, then dig out a shallow pit and spread sand or earth on them, over that putting a mulch again. If this is not convenient then cover nuts in boxes with sand and place in shady spots of buildings or hedges to freeze and undergo the natural changes.

Still treating of trees that grow freely from seed, we come to the early-ripening ones which include all elms and soft maples. The time is generally about the 15th of June, the time of ripening varying a little according to locality. The general crop of seeds on elms and maples will be found ripe enough for sowing as soon as any are observed to be falling to the ground. They should be then gathered and sown in drills two inches deep and two feet apart. Select a spot partially shaded through the day—good, clean soil, well manured and deeply dug must be the conditions all the time to get a good growth the first season. If weather is very dry, water freely. The young seedlings, if all conditions are complied with, should make a growth at least fifteen inches the first year. They can be allowed to stay in seed beds for two years, when they may be removed, sorted into different sizes, the roots trimmed, tie in bunches and heel out plants at convenience; or they may be packed in a cellar till a suitable time comes for planting.

If not convenient to sow when gathered, the seeds may be kept in drawers or bags in a dry place till fall when they may be sown, but when sowing them again let me remind you of firmly tramping the soil over them—mulching will not be necessary in the summer sowing.

The trees that ripen their seeds in the fall are the hard maple, Norway do. ash leaved or box elder, buttonwood, birches in variety, ash in variety, basswood locust, wild cherry, alder, and mountain ash. They may be all sown at once according to directions for summer sowing with the instruction to mulch them well. The mountain ash should be bruised with a hoe, then wash out the pulpy integument as cleanly as possible, dry the seed and mix with sand and sow as before in drills in a partially shaded spot.

The pods of the locust may be gathered during fall and sown then or kept through the winter for spring sowing. This tree grows very freely from seed and very rapidly, and its timber makes the most lasting for posts or cellar foundations. The tree is a little late in leafing out in the spring, but when in full leaf is very beautiful and deliciously fragrant and charming when in flower. In winter the jagged dark trunks and branches of lighter color make it decidedly picturesque in appearance.

Of the colors, season of leafing in spring or other peculiarities, I shall speak of further on and will still keep to the propagation feature of my article.

We have spoken about varieties principally to be raised from seeds. Some I have mentioned are easily raised from layers in seasons when seeds are not abundant. To do this what is termed a stool ground is necessary where trees such as the basswood or linden, alder, tulip and others are planted say five feet apart each way. After planting in the stool ground the original plant is cut to the ground and the young shoots or suckers that grow up immediately are bent down with a little twist or cut of a knife and soil covered over the cut with the top appearing out of the soil, now weights such as bricks or stones can be laid on the top of the soil to hold the young layers in position. After a year in this state they may be lifted and found ready rooted to be treated as young trees, trimmed and planted in nursery rows for future transplanting. The parent stool will again grow out, when another crop of young shoots will come again for layering and so on.

Having spoken of the layering system, I now come to the classes of trees to be readily propagated by cuttings from one and two years old wood. In this class we find all the poplars and willows in their different varieties, besides mulberries and numerous small growing trees, or perhaps more properly speaking, large growing shrubs, such as elders, syringas, etc.

THE CUTTINGS

Are gathered after leaves have fallen in the fall or during the winter season any time. Make these into one foot lengths with a sharp knife or axe, observing always that the top buds are kept upward in their natural position, then after making tie up in convenient bundles for handling—bury in sand or sawdust either in cellar or outside in a pit dug for the purpose covered with soil first and straw second to keep from freezing, or better still, plant in rows in the fall up to the top bud and afterwards mulching.

This is an expeditious way to propagate all the willows and the various poplars. For reclaiming a hillside cuttings could be pushed into the banks, here soon growing they would prove valuable in protecting banks from slipping down by winter frosts, besides giving shelter to other trees. Especially EVERGREENS, and of evergreens we cannot say too much in praise of their usefulness. Canada is essentially the home of the most valuable evergreens. Much of the early wealth and present prosperity of the country may be attributed to our extensive forests of pine, cedar and hemlock. But that phase of the subject has been discussed frequently by abler pens than mine, and I will now draw attention to the methods of propagating and transplanting. So many are to be found in swamps and other places selfsown and in such abundance that it is hardly necessary to speak of propagating them from seed. This is easily done but requiring such a system of partial shading, watering, and airing, that the average amateur had better buy small plants from those who make a specialty of growing them. Were I confined to grow one class of trees alone I think I should choose the evergreen family. It is exceedingly interesting to study the habits of the individual varieties, whether pines, spruces or cedar. They vary so much in the colour and formation of their foliage; and how extreme is the difference in the appearance of the bark from the smooth, shining covering of the young plants to the bold and rugged exterior of the monarch pine on the high cliff side, with its gnarled branches tossing its tasselled plumes in defiance at passing gales or gently sighing in the summer breeze. Our native trees are all more valuable than any imported strangers, though we could not well spare the handsome Norway spruce, or the useful and picturesque Austrian and Scotch pines. The former is invaluable for hedges and screens while the others are equally valuable for those purposes, as well as being planted singly for adornment. When procuring young evergreens from neighbouring woods choose a damp, cloudy day in the latter part of May. Whether in pulling them up by hand or digging the plants up with a spade be especially careful not to break the roots and to avoid exposing them to the air and sun as much as possible—packing them tightly in boxes with damp moss or other litter. When planting them assort the varieties by themselves, such as the pines together, cedars by themselves and the spruces; dip the roots in thin mud and plant about the same depth as they stood formerly. Evergreens should grow as close together when young as possible, as their foliage keeps the soil shaded and moist and prevents the trees from a too boisterous acquaintance with the wind till they have made some growth and become established. From the nursery row they can be thinned out alternately, leaving those that stand to become larger, and what you take out can be planted where they are to stand permanently, whether for groups or in hedge rows or shelter belts.

Trimming or pruning trees may be done any time after the first of July to the first of September. I mention this time particularly as during this season the sap begins to thicken and turn into wood, the edges of any cuts become calloused or partially healed over, and at this time a person may observe the trees to increase in diameter, and notice the formation of the new bark by the divisions and corrugations of the old bark. At this time crooked trees may be easily straightened by bending this way or that, according as the direction of the crooks. Crotched trees may be made to have one leader, by tying the two leaders together firmly at their strongest part, and cutting one leader back to within a few inches of the tied part, leaving the straightest leader. The following year the spur may be cut off, and you will find a comparatively straight tree with another year's growth. Tall, weakly or spindly trees, with irregular misshapen tops, can be made stocky, shapely trees, by cutting hard back in the fall. Wonders can be done even on trees twenty-five to fifty years old, by cutting back the old tops. Old country people are quite familiar with pollard beeches, ashes and many trees that are cropped every few years for their branches, which are applied there to many uses. To sum up generally, do not plant evergreens and deciduous trees indiscriminately, but plant each by themselves—(deciduous trees are those that drop their leaves in the fall)—each variety being impatient of the shade or drip of the other. I omitted to speak before of the larch or tamarack, as useful a tree as a farmer can have on the farm. Our native variety furnishes a heavier and tougher wood than the European larch, but is not any more durable, besides not near so rapid or as straight in growth. A row of European larches on a farm is a valuable acquisition. From it, in a few years, you may get any sized binding or reach pole, fence posts or building rafters you might want suitable for sheds or other structures. The young plants should be planted in the fall or first thing in spring, when the frost is out ot the soil; to succeed well, as it starts to grow early, you cannot plant it too soon; otherwise, if left too late, it is rather an uncertain grower.

The care required to grow all kinds of forest trees is simply the same as to grow a corn crop well. Keep the weeds down and the ground well cultivated between the rows, plough up well the last thing in fall, leaving a deep furrow between the rows of trees. One thing, never put any fresh manure in contact with the roots of newly-planted trees, as this means simply death, especially to evergreens, but if the soil requires stimulating plough a light furrow from the trees on either side or one side will answer, fill this with well rotted manure and plough back. This will have the desired effect in time, without endangering the life of your trees. Finally there should be two planting days on every farm each year —one day to plant maples, elms, etc., and the other day evergreens alone, that would be later on in the season. Should this be a practice on every place what a boon it would be to every one in time. Nor should any one be deterred by the thought of the time it takes trees to grow in; they grow faster than many think, and any way some one will get the benefit of another's labor, as we often have rested in the shade and refreshed ourselves with the fruits raised by the thoughtfulness and industry of others.

Residents in the partially cleared parts of our country who have plenty of bush still standing, and more stumps than they care for, naturally cannot understand the interest taken in tree planting, or why so much is said and written about the subject. But to this class in particular we give special warning, be careful of your trees. Map out what fields you are going to have, and be sure when fenced to leave a good border growing around each field. Leave here and there an occasional five acre bush lot for future use, which will prove invaluable in the course of twenty years. To farmers in old sections of the country we say, if you have not a young nursery on your place set about at once. Fence an acre or so of good well-drained land for the special purpose of growing trees, lay out a ten or twelve feet border on one side, then a roadway that will serve as a headland to turn your horse on when cultivating or ploughing amongst the trees; lay out the rows for trees four feet apart. Plant some young maples, elms, ash or any trees you can get handy. Making a start and seeing nice young trees evenly planted will create a taste and desire to go on further, and will develop a love for a pursuit which when once commenced, will prove to be a fascinating and a productive one. To plant successfully, see your trench is deep enough, but just deep enough to receive them easily, without bending, but not too deep, as deep planting is more fatal than shallow. Newly planted trees of any class should be about an inch deeper than they stood formerly, after firmly treading and levelling nicely. Amongst newly planted trees you cannot hoe or cultivate too often to keep weeds down and the soil loose and mellow.

Most of tree planting on a farm can be done in the fall, especially trees such as larch, hard maple, willows, poplars, elms and ash. Evergreens will do better to leave till May. Thousands of young plants of European birch, sycamore, alders, lindens, English oak, Norway spruce, Austrian and Scotch pine, are imported by nurserymen from Great Britain and France every year. These are then grown into large trees and sold for the planting of parks, avenues, cemeteries, and private places throughout the country.

For your nursery then procure a few hundred of each variety from your nearest nurseryman, which can be procured very cheaply, and what with young trees, deciduous and evergreen, you can procure from the woods, you will be soon surprised at the stock you will have. A few years work, and constantly adding to it, will provide you with abundance of trees to plant about the farm. But I need not enlarge on this, but simply conclude by urging a start to be made. At our school-houses much might be done to interest and instruct children in the knowledge of trees; to learn them to distinguish one variety from another, and how to grow them by having a small plantation comprising one or more of our native trees, properly labelled with technical and common name attached. A little has been done in this direction by instituting Arbor Day. We trust the love for planting trees will increase, and any effort in this direction should receive every encouragement.

To enter more fully into details respecting the growing and cultivation of the different trees, I repeat again that it is fortunate for us that our principal trees, native I mean, are easily propagated either from seed, or can be procured at an exceedingly low price from nurserymen. But the intending planter who wishes to learn how to produce stocks indefinitely for himself; who desires to become acquainted with all the minutiæ of gathering seed, sowing, and the subsequent care necessary to grow successfully his own trees, cannot fail to do so, we think, if the following methods are observed.

To commence with the maple, it is necessary that they become acquainted with the different varieties, which for simplicity we will divide into classes, *i. e.*, the hard and the soft. The scarlet or soft maple when grown alone does not make a very upright growth, growing, in fact, very irregularly, forming a many-branched bushy head, but when planted closely in rows or in groups the crowding together has the effect of producing a much straighter tree, and, consequently, better timber. For shade and ornament it is indispensable. It is one of the earliest to bloom in the spring and very beautiful it looks; its small crimson blossoms appear thickly studded all over its leafless branches. For rapid growth, fine smooth bark and straight trunk, combined with luxuriant foliage, the silver-leaved maple is unequalled either for shelter-belts or street planting.

Both varieties *ripen their seed in the early part of June.* This fact we wish to impress on the memory of the reader, as at this season when every thing is in full foliage, and when other planting operations have just been completed, and the mind may be engrossed with the cultivation of the young growing crops, the ripening seed on maples and elms may be forgotten till too late to gather, from having fallen and been scattered.

Observing then the seed crop on the trees carefully, and when ripe enough, which will be indicated by the seed beginning to fall; gather at once, and sow in a well-prepared bed of rich garden soil in drills opened by a hoe to the depth of two to three inches. Make the rows about twenty inches apart. Sow the seed moderately thick, or about as plentiful as you would sow beans. Cover the seed evenly and tread the soil firmly on the seed. The seed will start to grow in a few days, after which keep the ground clear and free of weeds and well cultivated. The first summer they will grow eighteen inches to two feet in height. From the seed-bed they may be transplanted the following spring into nursery-rows. This is the second operation, and the future success will depend on the soil and the cultivation given. The maple thrives in a rich, sandy loam, rather dry than moist, so that if land is low and wet it should be thoroughly drained. In fact, whatever here may be said about cultivating any tree, and the writer's main object in this article is to instruct or point out the means and the most expeditious manner to propagate young trees rapidly, without regard to the manner of their disposal afterwards by the grower, we must insist on planting on dry soil, if not so naturally, to be made so by artificial drainage. To make a sweeping assertion, we maintain that no tree thrives in wet places, that any that may be found growing in wet situations would have thriven better if planted in well-drained soils in the corresponding time. Land well drained permits being ploughed and planted much earlier, is warmer in temperature, thus prolonging the growing season, while every one knows that the best time of the season for growth is in the earlier part, and this important advice applies to any operations on the farm, nursery or garden : *plant early.*

In preparing the young seedlings for planting, be careful to assort them all into even sizes; this for convenience may be said to be three. namely, the large, the medium, and the small. By this you have all started evenly, which is really more important than may at first appear, for if the seedlings are planted without any regard being paid to size, the consequence is that the Darwinian truism "survival of the fittest," is exemplified with a vengeance. The largest having more root power rapidly possess themselves of all the "good things," to the almost complete extinction of their smaller brethren.

When sorting the seedlings have the pruning knife in hand, ready to trim any side-growth that may be on the plants, also to clip the roots into proper lengths, say six to seven inches We say proper lengths, as anything over this is not actually necessary for the future welfare of the seedling, and the cutting of any long or tap roots has the effect of producing fibrous roots from the cut part, thus causing the young plant to thrive better besides, And this is important, minimising the risk of failure in future transplantings. Do not cut back any of the leading stem unless the plant has grown crooked by some means. In such a case it should be cut off just at the bend. Do not plant if your soil is very wet, it should just crumble, as if it is too moist it is apt to bake and crack, much to the injury of the young plantation.

Having the rows four feet apart permits the use of ploughing and cultivating with a horse, in fact, with an occasional hoeing by hand, the whole labour of cultivation can be suitably done by horse-power. Plant the seedling in the rows about a foot apart at first. After growing for two years they can be thinned out, leaving young trees four feet apart each way, when they may be left for permanent shelter and so on. All the foregoing instructions respecting planting and sowing the seed applies equally to the care of any trees that may be desired to grow. A crooked tree is an abomination, and sometimes, from one cause or another many of them exist in the rows. Wherever they are cut them down to the ground in the spring. The stock then will throw up numerous suckers. As soon as they appear, trim all off excepting the one appearing to be the straightest. This at once grows rapidly, having all the root-power belonging to the previous growth, and producing a smoother and straighter tree in less time than if allowed to grow without cutting.

The hard or sugar maple, a tree no Canadian can praise too much, or grow too many of, ripens its seed in the *fall.* Sow it at once, as directed for the soft maple; but as the seed has to lie all the winter, it is necessary to have the seed-bed in such a location, or made so by surface drains, that no water can lie on it during the winter season, and another essential is to be sure and mulch the bed or seed-rows with a good top dressing of long manure or other litter. Manure is the best for the double reason of enriching the soil and preventing upheaval of the seeds by frost. In the spring, after the warm rains and settled weather has set in, remove the manure by raking to the centre of the rows, where it may be left, and where it will have the good effect of keeping the soil moist and preventing weeds from growing. The young seedlings will soon appear, and all the care they will require through the summer is an occasional hoeing, They should make enough growth that season to warrant transplanting the following spring, if possible. They may be left, however, another year in the seed bed, when it will be imperative to move them. Whatever time you may transplant, give such attention to the manner of assorting and trimming as we recommended for the soft maple. They may be planted in the fall if the ground where they are to be planted is well-drained. Generally on the farm, there is more leisure in the fall to do work of this kind than in the spring, and the suitable time is any time after the first of October. If the leaves have not fallen strip them off by hand. This is necessary, for if the growth is not completed the evaporation of the sap by the leaf dries up the bark of the seedling and considerably weakens if it does not actually destroy it altogether. It seems almost needless to point out the value of the hard maple. It is a tree both valuable for shade and for its sap to make into sugar, for which purpose alone it pays to grow in groves or in rows. Its wood is valuable for fuel and for lumber. The timber is used for flooring, and many uses too numerous to mention. Its foliage is clean and thrifty, and singularly free from insects of any kind. It is truly, in every sense, worthy of being the emblematical tree of Canada.

The Norway maple also forms an exceedingly handsome tree, (being superior for lawn or park purposes) to the sugar maple, having larger leaves and forming a dense round-headed tree of noble proportions, requiring only to be seen to be admired, and planted to be appreciated. It also ripens its seed in the fall, and requires the same attention advised for growing the other maples. When young it is a little tardy in growth, but soon afterwards makes a rapid and luxuriant growth.

There are many other sub-varieties of maples all of value, but known and grown for ornamental purposes principally. We have spoken hitherto only about growing the young trees from seeds, but in many places thousands of young trees in all sizes of growth, can be procured easily self-grown in the woods. Where such woods exist, having young seedlings growing in their midst, we advise procuring them in the fall, if possible. As at that time, there being no frost in the ground, and of a certainty much drier under foot, they can be collected with a greater degree of comfort, at any rate. Young plants of the elm, ash, birch and others, may be procured at the same time, assorting them afterwards into separate bundles for the sake of system and uniformity. In fact, so numerous are the self-sown plantations throughout the country, that hardly any one has any reasonable excuse for not having trees wherewith to plant. Where these seedlings can be procured, care should be observed to keep them covered from the sun by piling in a shady spot and covering with moss or other protection. Assort into sizes and trim roots and side branches, and plant in rows as before directed. Where it is not convenient to plant in fall, the young trees may be heeled in trenches in some dry spot, or may be kept in cellars, simply covering the roots with sand or soil. Remove any rubbish or weedy borders or other places of cover that would harbor mice, for this little animal plays great havoc by girdling the bark in the winter, particularly during heavy snow-falls. All plantations should therefore, have clean cultivation the first few years, as much to guard against these depredations, as well as to stimulate the growth of the young trees. After that time they furnish sufficient shade themselves to retard any undergrowth of weeds.

It may happen sometimes that opportunity offers to make plantations of young trees without the land being sufficiently rich to give a good after-growth to the trees. In such instances plough a furrow from the young trees on one side. This furrow fill up with good stable manure. A furrow thrown back again the opposite way will cover the manure, and furnishes in time all the needed fertilization the young trees will require. But where it is possible, the deeper and better the land is cultivated the better the result. The question of distance is always a vexed one in regard to forestry, and taking the maple tree as an instance for all others, we say you have just the results that you may expect by considering the matter a little. The closer the trees may be planted, the weaker they will be ; the farther apart, the stronger. As there is just so much nourishment for the roots in the soil, just so much moisture and just so many rays of sunshine, and nothing can add to or take from the whole sum; so that if twenty trees are planted where four should grow, you have the result of the growth of four trees divided into twenty. Or supposing an acre is planted with trees four feet apart each way, you would have 2,700. If planted eight feet apart, then you have 1,350. Those planted eight feet apart would give, at the same time, just as much return, if not more, than those planted four feet apart. I am inclined to think that six feet each way would be a safe distance, presuming the object is to grow trees for profit, etc. I omitted mentioning to give. a summer pruning any time during July or August, not to touch leading shoots at all, but to trim off all side-shoots up to a height of say, six feet or higher, according to the sturdiness of the growth. Summer pruning may be omitted altogether where the trees show any indication to be weak or spindly ; in such a case its better to leave all lateral growth, as this will tend to thicken the growth or the diameter of the main trunk, the after-growth of the main head will shade so much as to completely stop all lateral growth, and any remaining will eventually die and drop off naturally, similarly to what has occurred in the primeval forest.

All varieties of the elm ripen their seed in June, when it must be gathered and sown in beds and treated in the same way as recommended for the maple. The Scotch or Wych elm is more prolific in bearing seed than our native species, while its wood is just as valuable if not more so. It starts into leaf earlier, and retains its foliage longer and thrives in all conditions of soil with equal facility. The bark of this variety is smoother, and the buds rounder, than our native elm, and taken all in all, it is an exceedingly desirable forest tree. We do not wish, however, to detract anything from the estimation of our native elm, which we regard with the greatest admiration. It may be properly called the palm tree of Canada. Towering up to a noble height, its branches dividing from the single shaft and spreading out into graceful proportions, covered with abundant foliage, it presents, as a single specimen, one of the most beautiful objects to be seen in a Canadian landscape. For street planting I consider it to be the finest of all ; growing rapidly to a height of forty to fifty feet, it permits a view of the houses and premises from the street, allowing the air to circulate freely, while its luxuriant foliage overhead gives grateful shade below. It bears transplanting with impunity as it rarely forms a tap root, and it can be moved as a large tree better than any other species. Its wood is used for many purposes, notably in carriage work, furniture or objects requiring bent or turned wood.

The other varieties, such as the corky elm and the red elm, differ but little in usefulness, excepting that they do not grow so large as the white elm. In nursery rows the elm soon makes a straight tree, but where there are two or more leaders it is advisable to tie them firmly together with hempen cord, so as to leave one straight leader, and cut the others back to within say six inches of the tied part.' The spurs may be pruned close off as soon as the straightened part is firm enough to stand alone. This should be done with any of the other classes of trees that show two or more leaders. And to avoid repetition, the care necessary to produce one straight tree or grow it, for that matter, applies equally to all.

Coming to the *ash* family we find for general purposes this to be most useful tree of all. The young trees are valuable almost from an inch in diameter, and enquiry made by the writer from one of the largest implement manufactories in the Dominion of forks, hoes and other farming implements elicited the reply that the principal wood used in their establishment was the white and black ash, and they were now finding great difficulty in getting sufficient supplies to carry on business with. When one establishment out of the many engaged is put to straits at the present time what must the dearth be, say twenty-five years from now, if some prompt means are not taken to replenish the present stock by replanting. The ash tree, of which there are many varieties, the most useful being the white ash, grows very rapidly and freely in all soils, particularly in moist and humid situations. Though starting later in growth than any other of the different trees with the exception of the locust, it is yet quite desirable as an ornamental tree, while its value as a timber tree cannot be over estimated. It ripens its seed in the fall when it should be at once sown in rows and mulched as before advised. Its after cultivation is the same as other trees and the writer recommends it for planting for profit alone by the acre. Mr. Budd of Iowa, states " that ten acres of ash trees grown six feet apart, contained twelve thousand trees and at twelve years of age were eight inches in diameter and thirty-five high. The wood from thinning paid all expenses of planting and cultivation. The bodies of the trees cut out sold for forty cents each, and the tops were ten cents more. Ten acres of this timber twelve years old were worth six thousand dollars." This seems to be a very practical statement, and from the growing scarcity of this wood it would follow that here is a profitable speculation for any of our planters to enter into.

Our two most common varieties of the oak family are the white and red, of which it is needless to state the former is the most valuable, and for durability, strength, and the many purposes it is applied to is the most valued of our native woods. It is second only to the hickory, but from the scarcity of this tree it cannot be said to compete. The better quality of white oak timber is said to be worth $100 the thousand feet and scarce at that. How necessary then that steps should be taken at once to propagate this valuable tree, as it grows well on all soils but freely on good soil, and sufficiently to warrant growing it for profit in an ordinary lifetime. The acorns ripen in October when they should be gathered and sown at once, and as this is one of the first of the nut trees to be mentioned the directions here given will apply to all that class. The hickory, chestnut, walnut and beech will grow under the conditions advised for growing the oak. Gather the acorns or nuts as fresh as you can, sow in drills made two to three inches in depth—the larger the nut the deeper the drill,—cover with soil, tread firmly and mulch heavily. This is the great requisite, as most of the nuts will grow on top of the soil if only mulched with leaves or manure. If not possible to plant in the fall then put into boxes and mix with damp sand and leave outside in a shady spot where they will not be disturbed till the following spring, when they should be planted as early as possible. From the seed bed transplant after one year's growth trimming off the tap root a little, say one-third of its length. There is no difficulty at all in transplanting the oak, chestnut, walnut, butternut or beech if they are planted promptly and not exposed too long to sun or wind. The hickory is the most diffident of all the nut trees, growing very slowly and forming a long tap root. In transplanting the hickory leave all root on it, simply bending it in the trench and tramping the soil very firmly about the collar. This for transplanting. It is recommended, however, to plant the nuts where they are to grow into permanent trees and giving a course of cultivation, with most thorough and frequent stirring of the soil, keeping free of weeds, etc. To make it bear nuts early dig under with a sharp spade and cut the tap root, firming the soil back with a heavy tread of the foot. This has the same effect as transplanting, only better, as it does not disturb any of the few fibres that may be growing laterally in the soil. The walnut and butternut both bear having the tap root cut back and transplanting quite readily, and the oftener they are transplanted when young the more easily they may be transplanted when they become large nursery trees; growing the nuts in sandy soil of any of the nut class of trees will induce more fibres than if they are sown in clay land, which they should never be at first. The sweet chestnut, which is rather a shy tree in transplanting, is easily grown from seed. Keep the nuts, after getting them as fresh as possible, in boxes well mixed with damp sand in the cellar in a cool temperature, so that they do not rot or mould. Sow the nuts in rows in spring say four inches apart and cover with a half an inch of soil. Cover the young growth the succeeding fall with coarse litter or loose straw six inches deep, transplanting the following spring. To return to the oaks, no one need be deterred from growing them for fear of not succeeding. They transplant quite easily up to a height of from three to four feet, but after that the percentage of loss would be too great to bother with them.

Our native basswood is a handsome, rapid-growing tree. The wood is of great utility from its toughness and lightness, and enters largely into modern manufacture. The seed ripens in the fall, when it should be gathered and sown. The European variety, or linden as it is commonly called, is grown by our nurserymen for ornamental purposes, and planted largely by apiarists as its flowers are said to yield a very superior honey. It is imported from European nurseries, where it is grown very largely. An avenue of this tree is planted in Berlin, Germany, which has become quite historic, and is often referred to in the doings of great personages as "Unter der Linden." This variety has not as large leaves as our native tree, and is very subject to attacks of the borer, which very much curtails its longevity.

One of the most useful trees, as well as being a very rapid grower and coming soon into the market for many uses, is the European larch. This variety is quite superior to our native tamarack, growing more erect. It is imported at such a small cost from the old country that it would not pay any one here to grow it from seed, unless they made a specialty of it along with evergreens which require the same treatment. The larch occupies a middle place between the deciduous and evergreen classes of trees. It belongs to the coniferae, from having cones, the wood being resinous, the arrangement of its leaves and branches the same as the spruces. but it resembles the deciduous because it drops its leaves. In this it resembles the deciduous cypress. It is the earliest tree to commence growing in the spring and therefore should be planted in the fall or the very first thing in spring. A row of trees which the writer helped to plant in 1873 are now from thirty to forty feet high and varying from eight inches to a foot in diameter one foot from the ground. They could now be cut down for fence posts, shed rafters or scaffolding poles, or firewood. The trees are as straight literally as gun barrels and present a very fine appearance.

Both our native basswood and European linden furnish that useful material, indispensable with nurserymen and gardeners, termed bass matting, and its production is as follows: Early in summer, say about the first of June, sections of the bark of matured trees from one foot to three in diameter are removed in widths of a foot wide and six feet in length or thereabouts; these are laid in a shallow pit and covered with water; there they remain from two to three weeks; when the inner bark will be found to come off in sheets of a thin papery-like substance, but of sufficient strength to be used for tying up all kinds of buds and plants, or any work common in greenhouses and nurseries. In the old country it is woven into mats, useful for shading and protecting hot-beds, or for packing purposes in hardware and crockery business.

Speaking of soft wooded trees, such as willows and poplars, we wish to draw attention to their great value for retaining banks by taking cuttings of stout one and two year old woods, a foot in length, and pushing into the bank or by making notches with a spade and inserting the cuttings to the topmost bud, making sure to firm the soil well around them. They soon grow and serve the purpose of nurses to other trees, such as maple, birch or evergreens of the different kinds, as pine, cedar and spruce. After these are well established, the willows or poplars may be cut down repeatedly till such times as the harder wooded and more valuable trees occupy the ground. . The planting of the side hills and deep bluffs, now naked and bare, would conduce greatly to keeping up a supply of fresh water during the season in the flats and creek beds now so universally dry and bare during the hot weather. We know of thousands of acres of side hills that are entirely unfit for cultivation, that could be made to serve the necessary purposes for providing shade and shelter, wood and water, by replanting in the way we have pointed out. The retention of the winter's snow by the shade of the pine and cedar, would prolong the supply of fresh, cool water, a desideratum on stock farms too valuable to be estimated. We well know now that springs and watercourses familiar to us in boyhood, have long since dried up, not altogether due to the deforesting of the tree clad hills and valleys, but also to the universal practice of underdraining. We well know that where drains, surface and under, are in good working order, the surplus moisture in the land is soon run off on the hill sides or into natural hollows, which in the spring run off the water, flooding the creeks and lower lying lands. But I do not say a word against underdraining ; that would be an outrage on all accepted canons of agriculture that I do not dream of committing, but I do say leave the trees and all possible undergrowth to protect the banks and hill sides, so that where drains, under or over, discharge their contents, it can be used to irrigate the banks and covers, furnishing the needed moisture to stimulate the growth of what may be now growing, and to start the dormant tree seeds that lie plentifully enough beneath. By doing this the arable uplands and plateaus are kept well-drained, but fringed around with a crown of sheltering trees, that break the biting winds from every quarter, retaining the snow—nature's protector in this land of sunshine—as well as keeping the land well drained. So that each operation will work to the other's advantage. This is the only happy medium in Canada.

With many, the great objection to forest tree planting is, that it takes so long a time to grow trees, forgetting that every season they thus delay they are prolonging this time indefinitely. Inside of twenty years the writer has seen piles of cordwood, nearly as long as the rows of trees they were cut out of, cut from trees he had helped to plant as cuttings and young plants from seed bed. While long before that the same rows furnished trees thinned from them that are now growing on streets and in parks, an ornament to their surroundings and a lasting credit to their planter.

In evergreens we are particularly rich in Canada. The species indigenous to our soil, comprises the most valuable woods in the world. From the great demand, however, and the reckless destruction that follows in the wake of the lumberman, the most prompt steps should be taken at once to conserve what we may have left, as well as to renew by replanting. Towards this object then, every energy should be directed before we kill the bird altogether that lays the golden eggs. All varieties are easily grown from seeds sown in a shady, moist location, but where the young plants have free access to air. A suitable bed is made by having cold frames, that is boards six inches deep, five feet wide, and any lengths to suit the quantity of seed desired to be sown. Make the bed of sandy loam, and sow thinly in drills six inches apart and half-an-inch deep, covering slightly and pressing the soil firmly with the rake head, shade the bed with lath frames nailed diagonally with diamond-shaped insterstices, this gives that shifting shade and light the plant would if receive grown in a natural way in its natural forest. When young seedlings appear, lift the outside frames sufficiently high to permit a brick or other object being set underneath to keep it there. This has the effect of allowing the air to circulate freely amongst the young plants, hardening them and drying the surface of the soil, thus preventing what is termed damping off. Seeds may be procured from the cones, which should be gathered in the fall and hung up in muslin bags in a warm place, the temperature reflexing the scales of the cones, allowing the good seed to fall out into the muslin. Keeping them this way prevents mice from eating the seeds, besides preserving the seeds from mould and mildew.

When is the proper time to plant evergreens is a question frequently asked. When a person is careful to keep roots damp and covered up from the sun and wind an evergreen may be planted at any time of the year. The writer has helped to plant hedges in August which have grown with scarcely requiring a plant to be renewed, simply because they were not exposed, and were freely watered after being planted, but to definitely state a time to suit all varieties and locations we say any time during the month of May. At this time when the roots are beginning to show the young white tips of the new growth and top buds are also showing signs of starting we have always found to be the most fortunate time. When setting out young trees from woods or nurseries, be sure to make a what is termed a grout or in other words a thin mud of clay into which dip the roots, this forms a moist adhesive covering which prevents undue exposure of the roots till such time as they come in contact with the soil in new plantations. In planting be careful not to plant too deep; more trees die from deep planting than by being too shallow. Allowing for the subsidence of the soil after planting, a tree should then stand the same depth in the soil as its roots were covered in its former nursery or forest home. Firmly tramping the soil is the most necessary act in successful planting, and also to be careful not to allow any fresh manure to come in contact with the roots. It would be fatal kindness to allow that, but if the soil requires enriching rather put it as a mulch on top of the soil. Evergreens are impatient of manure anyway, and thrive on thin sandy soil better than any other class, so long as it is naturally dry or made soby artificial drainage. In making young plantations or setting out plants for the purposes of growing, to draw from as occasion may require in planting shelter belts, put them as closely together in rows and have the rows as close also as will permit cultivation. By so doing. the plants give mutual protection, shading the ground, keeping the roots cool and moist, and creating that still atmosphere amongst its branches so conducive to the health of evergreens; never plant evergreens among deciduous trees but always in groups or rows by themselves ; the drip from the foliage of large leaved trees and their overshadowing influence is particularly fatal to evergreens.

HOW TO PROCURE GOOD FOREST TREES FOR PLANTING.

The following article is by the Hon. H. G. Joly, Quebec, and was read by him at the late forestry meeting there. It contains, in short space, much useful knowledge, and may be thoroughly depended on :—

It is not easy to procure young forest trees worth planting. The trees raised in the *nurseries* can generally be relied upon, and they are sold at moderate prices, but owing to distance, want of easy communication, delays in forwarding and delivering, (which are often the cause that the trees, when received, are unfit for planting) and to the cost, however moderate, it is very seldom that the farmers have recourse to the nurseryman for the *forest trees* they intend planting. (I do not allude, here, to *fruit trees*).

They generally go to the woods for them, often a distance of several miles. Those who have tried it know how hard it is to find such trees as they want, how much time and trouble it takes to dig them up, and how impossible it is, even with the greatest care, to avoid wounding and tearing off the roots. They know, too, how little satisfaction they have generally derived from all that work. Trees taken out of the forest and transplanted on the open, are placed at a great disadvantage; they fail so often that people get discouraged, and many give up tree planting as too difficult an undertaking.

Nothing is easier; in the proper season, with soil fit to grow the kind of tree you wish to plant, if the tree is *in good order*, with a little care you ought to succeed. But the trees you dig out of the woods are seldom in *good order*, and they cost you a high price in time, if not in money. If you wish for good trees, in great number, safe to grow without trouble or expense, procure them from a nursery, *but let that nursery be your own.*

Any farmer can start, in the corner of his garden, a nursery of forest trees, by sowing the seeds of the trees he wishes to plant. With a little observation, it is easy to find out when the seed is ripe. For instance: towards the end of June, beginning of July, the seed of the *elm* and of the *soft maple* (acer rubrum) is ripe; by sowing it at once it will sprout, and the little trees grow nearly one foot in height this summer.

The maple, oak, ash, birch, butternut, etc., ripen their seed in autumn. Better sow it at once than winter it in the house. Sow in straight rows, with a garden line, leaving a picket at each end to guide you when weeding. Sow, say half-an-inch deep for the maple seed, and for other kinds, in proportion to the size of the seed, two or three inches deep for butternut and walnut. Thin after the first year, if needed, and transplant further on the little trees removed in thinning. After three or four years, more or less, (the time will depend on the rate of growth of each kind of tree) plant your young trees where they are destined to stay. Choose a cloudy or rainy day in the spring, and, without leaving home, with no trouble, without breaking any roots, you will take up and plant at once, without allowing the roots time to dry, one hundred young trees, certain to grow, in less time than it would take you to go to the woods and dig up ten trees, with a poor chance of their taking root and living.

These young trees will cost you nothing; your children will soon learn how to weed them and take care of them, especially if you set them the example. Our own children, when quite young, took pleasure in sowing acorns and watching the growth of the young oaks as they came up. By sowing you can procure, with no expense, any number of young trees, and re-wood, by degrees, all the land which is not fit for cultivation and ought to have been kept as wood land.

But do not forget to *fence* carefully your nursery and your plantations, so as to keep out the cattle. No use planting trees without fences; the cattle will destroy everything.

In many cases nature will spare you the trouble of sowing. Where the ground is favourable, in July and August, along the ditches, the roads, the fences, on the moss on barren patches, wherever there is a little dampness, in the neighborhood of the *elms* and *soft maples*, you will find hundreds of young elms and maples just sprung up from the seed fallen from those trees; plant them in your nursery, *try it this summer*; the seed of the elm is so minute and delicate, that it is better to pick up those young seedlings than to attempt sowing the seed.

In the maple groves the ground is covered with a regular carpet of young maple seedlings. You can pull them up easily by hand in the fall or early spring, when the ground is still damp, without breaking any of the small roots. Plant them at once in your nursery.

It is very difficult to collect pine and spruce seed. Early in the spring, when the ground is still soft and spongy in the pastures, near where those trees grow, you will see a number of young pines and spruces that you can pull up very easily; plant them at once, for that kind of tree you must shelter from the sun until they are well rooted.

Whenever the ground of a garden has been dug up and worked in the fall, if there are any maple or ash growing in the neighborhood, it will be noticed that the ground in the spring is more or less covered with maple and ash seedlings, grown from the seeds fallen from those trees. It takes a very little time to pull up and replant hundreds of them, and scarcely any of them will fail; of course they must not be pulled up too roughly or it may damage the delicate roots; if the ground is too hard use a trowel. As much as practicable, they ought to be pulled up when they have only got their two first leaves, which are easily known by their peculiar shape, long and narrow, from one inch and a half to two inches long, and about a quarter of an inch wide.

For several years past I have been seeking the cheapest and, at the same time, most effective mode of restoring the woods, where they have been completely destroyed. Many of our old settlements are completely denuded of trees, and I can recommend the simple mode as the best, from my personal experience. Let those who suffer for the want of fuel, of timber for building, of trees for shelter and ornament, and those who would look to have a sugar maple grove at their door, let them start their own nurseries this very summer; it will entail no expenditure of money, take but very little time, and repay them bountifully. It will be a pleasure for me to give any further information, and advice to all those who may apply for it.

H. G. JOLY DE LOTBINIERE.

LECLERCVILLE, P. Q., May 1, 1890.

INFLUENCE OF WIND-BREAKS ON FRUIT PLANTATIONS.

This question, of very great importance to the farmers of Ontario, is not viewed by all alike. The best writers recommend wind-breaks for fruit plantations, but fruit growers are not so unanimous. I have endeavoured to obtain the opinion of Canadian farmers on this subject, but the replies were not sufficiently numerous for the purpose. It happens, however, that the College of Agriculture of the Cornell University, has instituted a wide-spread enquiry into the matter, and have obtained a large number, that is to say, forty-eight replies stating definite results. They chose New York and Michigan for their enquiries. As it is impossible to condense their information closely, I have copied their tables of answers, both as to effects observed from, and the proper methods of planting wind-breaks:—

I.—EXPERIENCES FAVORABLE TO WINDBREAKS.

A. IN NEW YORK.

OBSERVER.	Site and Soil.	Direction of Prevailing or severest winds.	Location in reference to large bodies of water.	Kinds of fruit grown.	Kind of Windbreak.	BENEFITS DERIVED.
Patrick Barry, *Rochester.*	Various.	W.N.	About 6 m. South Lake Ontario.	All kinds.	Norway spruce, European larch and other evergreens.	"We regard windbreaks, in this country, as of vast importance, not only in fruit culture, but for the comfort of man and beast."
Irving Rouse, *Rochester.*	Same level as surrounding land. Clay.	N.	do	Apples.	Norway spruce, on Northwest.	Increased crop. Less loss from wind-falls. No loss from severe cold.
J. Wentz, *Rochester.*	High, sandy loam.	W.	do	Plums.	Siberian arbor vitæ.	Good.
T. G. Yeomans & Sons, *Walworth.*	Undulating, strong, sandy loam.	W.	About 8 m. South Lake Ontario.	Apples, Dwf. Pears Quinces, small fruits.	Norway spruce, mixed belts, and natural forest.	Prevent windfalls. Render orchards more uniformly productive and longer lived. Render labor easier.
W. T. Mann, *Barkers.*	Slightly rolling, clay and sandy loams.	W.SW. NW.	2 m. South of Lake Ontario.	General.	Row of Norway spruce on W., set 2 ft. apart in 1874.	Fruits, especially pears and berries, have blossomed and ripened several days earlier near windbreak. Fewer windfalls. Retains snow for 10 to 15 rods from windbreak.
B. W. Clark, *Lockport.*	....	SW.	About 10 m. S. L. Ontario	General.	Norway spruce, natural forest.	Good.
G. W. Dunn, *Pierce's.*	Same elevation as surrounding orch'ds. Loam.	W.	On Lake Ontario.	Apples.	Beechwood land.	Trees start earlier. Fruits hang on longer. Winter apples more easily gathered.
C. P. Whitney, *Orleans.*	Very high ridge W. slope. "Limestone."	W.N.	N. of Canandaigua and Seneca L —about 8 miles.	Apples set in '73 and '74.	Natural forest.	"I see no difference in the growth of trees, except that they stand straighter where they are protected."
V. B. Wheat, *Orleans.*	High, sandy loam, ranging to gravel.	W.N.	do	Grapes, Apples, Peaches.	Natural forest.	"I am very certain that the protection from forest is beneficial in various ways."
S. C. Davis, *Medina.*	High. Clay and gravelly loam.	W.N.	About 10 m. So. L. Ont.	General.	Norway spruce.	Good.
E. B. Norris, *Sodus.*	Mostly high. Sand, grav. loam	W.N.	On Lake Ontario.	Apples.	Norway spruce.	Good.
C. H. Perkins, *Newark.*	....	W.	About 15 m. So. L. Ont.	Sml fruits, grps, q'ncs & peaches.	Norway spruce.	Protects from cold snaps; "no telling the good a windbreak will do."

W. G. Ellwanger, *Canandaigua.*	High.	W.	On Canandaigua Lake.	Orchard fruits & nursery st'k.	. . . .	Fewer windfalls. Prevents ground from freezing too deep and destroying nursery stock.
H. J. Peck, *Seneca Castle.*	E. and W. slope. Heavy loam.	W.	Midway bet. Canandaigua and Seneca Ls. About 6 miles.	Apples set in 1873.	Closely planted apple orchard on the west.	Fewer windfalls. Trees become more firmly rooted, and are more upright.
G. C. Snow, *Penn Yann.*	100 to 500 ft. elevation. Gravelly loam.	W.	At north end of Keuka L.	Peaches, apples, grapes.	Natural forest on W. and S. W.	Fewer windfalls. Less liability to damage to fruit buds from cold. Retains snow and leaves.
C. W. Pierson, *Waterloo.*	Slightly higher than adjacent lands. Sdy loam.	W.N.	Bet. Cayuga and Sen. L. —about 5 m.	Peaches and apples.	Norway spruce hedge, kept cut back to 10 or 12 ft.	"The result, I think, has been beneficial to the peach crop."
A. I. Hulett, *Elba.*	Gravelly loam.	W.SW.	About 20 m. south Lake Ontario.	Apples and pears.	Natural forest.	"Apples and pears so protected rarely fail, while others, on equally as good soil and exposed, fail one year out of three."
P. B. Crandall, *Ithaca.*	High.	W.	At south end of Cayuga Lake.	Peaches.	Farm buildings on north.	"Trees will blossom full this spring; in the field with no protection, buds have been mainly destroyed."
J. J. Thomas, *Union Springs.*	. . . .	W.	Near N. E. cor of Cayuga Lake.	Pears.	Double row of Norway spruce on west-	Trees near the windbreak less injured by cold winter winds.
Anthony Lamb, *Syracuse.*	Same levl as adjacent lnds. Clay l'm	W.N.	Near Onondaga Lake.	Nursery stock, grass and grain.	Norway spruce.	Much less injury to nursery stock from cold.
E. A. Powell, *Syracuse.*	do	W.N.	do	Nursery stock, also gen'l crops.	Norway spruce.	Protects nursery stock from effects of cold.
G. T. Powell, *Ghent.*	100 feet above adjacent lands. Gravelly loam.	W.N.	About 8 m. east of Hudson River.	Apples, pears, grapes and cherries.	Elms, maples and Norway spruce.	"Saves a large amount of fruit from being blown off." Holds snow. Lessens evaporation from the soil. Encourages birds.
Charles Gibson, *South Haven.*	High. Sand.	W.SW.	On east bank of Lake Michigan.	Peaches.	Lombardy poplars and natural forests.	Keeps fruit from blowing off, and prevents breaking of trees when loaded with fruit or ice.
R. Linderman, *South Haven.*	Very high. Sandy.	W.SW.	On east shore of Lake Michigan.	Peaches.	Norway spruce on the west.	Protects from cold winds, especially in blossoming time. In a certain year a N.W. wind in blossoming time, destroyed half or more of the crop on west of screen, but the protected orchard had a full crop.
H. J. Edjell, *South Haven.*	Very high. Sandy.	W.SW.	On east shore of Lake Michigan.	General.	Norway spruce enclosure.	Temperature is 5° higher in protected places in very cold weather. The most productive grapes are next windbreak. "I am thoroughly convinced of the value of a windbreak."
L. H. Bailey, *South Haven.*	High. Sandy.	W.SW.	On east shore of Lake Michigan.	Apples.	Apple orchard.	Windfalls are half less where trees are protected.

EXPERIENCES FAVORABLE TO WINDBREAKS.—*Continued.*

OBSERVER.	Site and Soil.	Directions of prevailing or severest winds.	Location in reference to large bodies of water.	Kinds of fruit grown.	Kind of Windbreak.	BENEFITS DERIVED.
J. F. Taylor, *Douglas.*	80 to 100 ft. ab. lake. Sandy.	W.SW.	90 rods E. of L. Michigan.	Apples and peaches.	Nat. forest, Lomb poplars, Scotch pine.	Retains snow. Prevents the falling off of fruit.
G. C. McClatchie, *Ludington.*	High.	W.SW.	On Lake Michigan.	Peaches and plums.	Natural forest.	Retains snow, and thus greatly protects trees.
S. M. Pearsall, *Grand Rapids.*	Same elevation as surrounding lands. Gravelly loam.	N.W.	About 25 miles east of Lake Michigan.	Apples.	Black walnut and butternut.	"The trees were not affected by the winds as much as my other orchards, and, I think, withstand the frosts better."
H. H. Hayes, *Talmadge.*	50 to 100 ft. higher than adjoin'g lands. Clay.	E.NE.	About 20 miles east of Lake Michigan.	Apples, peaches and grapes.	Natural forest.	Protects trees from cold snaps.
J. N. Stearns, *Kalamazoo.*	Same level as adjoining lands. Gravelly loam.	W.	40 miles east of Lake Michigan.	Bush fruits and grapes.	Norway spruce hedges, 12 to 15 feet high.	Holds snow, the protected "plants coming out much more fresh than those exposed." In summer, prevents wind from drying up the fruit.
R. J. Coryell, *Jonesville.*	High, sndy loam S.W. exposure.	S.W.	Inland.	Apples and bush fruits.	Nat. forest and row of deciduous trees.	On side next the windbreak, more healthy trees and fairer fruit.
L. D. Watkins, *Manchester.*	60 ft. above adjoining lands. Gravelly loam.	W.N.	Inland.	Apples and peaches.	Second growth forest.	Protects from cold. "Peach crop has failed but once in eight years. All orchards failed in this vicinity except these and a few protected trees.
J. Austin Scott, *Ann Arbor.*	....	N.W.	Inland.	Apples and pears.	Norway spruce and arbor vitæ hedges.	Good.
J. D. Baldwin, *Ann Arbor.*	Very high. Clay.	N.W.	Inland.	Apples, pears and peaches.	Second growth forest and Norway spruce.	Good for apples and pears.
D. G. Edmiston, *Adrian.*	Somewhat elevated. Strong clay loam.	S.W.	Inland.	Apples and pears.	Norway spruce.	Protected trees are healthier, and better shaped than others.
E. P. Allis, *Adrian.*	High. Heavy.	W.N. SW.	Inland.	Grapes, cherries, quinces, bush fruits.	Apple orchard.	"I think it is a great advantage."

PARTIAL SUMMARY OF TABLE I.

BENEFITS EXPERIENCED.	Number of observers.	No. occupying high sites.	No. occupying comparatively low sites.	No. occupying light soils.	No. occupying clay or heavy loams.	No. evidently influenced by bodies of water.	No. evidently not influenced by bodies of water.
In general,......................	37	21	8	17	11	27	10
Protection from cold,............	12	7	3	5	3	9	3
Lessening of windfalls,..........	11	6	4	6	4	10	1
Retention of snow,...............	6	4	2	4	2	4	2

2.—DEFINITE OBSERVATIONS WHICH FAVOR WINDBREAKS.

OBSERVER.	Site and Soil.	Direction of prevailing and severest winds.	Location in reference to large bodies of water.	Kinds of fruit observed.	Kind of windbreak observed.	BENEFITS OBSERVED.
O. J. Weeks, *West Webster.*	In general.	....	Very near Lake Ontario.	Apples and pears.	Forests and artificial shelter beds.	Fewer windfalls; "some years, more than one-half the entire crop" blowing off in exposed orchards, while few blow off in those well protected.
D. Bogue, *Medina.*	Clay loam.	....	About 10 miles S. of Lake Ontario.	Pears, apples, cherries and plums.	Norway spruce hedge.	Fewer windfalls.
W. C. Almy, *Dundee.*	In general.	N.W.	3 m. west of Seneca Lake.	In general.	Natural timber.	"Where the wind is very severe, a windbreak on the north and west would be very valuable"
A. Hammond, *Geneva.*	In general.	N.W.	N. end of Seneca Lake.	In general.	In general.	Fewer windfalls. High ground on the west is "quite important in many respects."
A. S. Dyckman, *S. Haven, Michigan.*	High. Sandy.	W.SW.	On E. shore of L. Michigan.	Peaches.	Evergreen hedge.	Prevents the blowing off of snow and sand.
C. J. Monroe, *S. Haven, Michigan.*	In general.	W.SW.	On E. shore of L. Michigan.	General.	Street trees.	"If all our highways were bordered with good rows of trees, we should find much advantage from them."

4.—Experiences Adverse to Windbreaks.

Observer.	Site and soil.	Direction of Prevailing and severest winds.	Location in reference to large bodies of water.	Kinds of fruit grown.	Kind of Windbreak.	Injuries Sustained.
H. M. Jaques, *Lockport.*	....	SW.	About 10 miles So. L. Ont.	Apples and pears.	Natural forest on North.	"Apples next the woods are poor color and very wormy."
S. D. Redman, *Newfane.*	Level. Gravelly loam.	W.SW.	Very near L. Ontario.	Quince.	Norway spruce hedge on E. W. and N.	"Have not been able to detect any difference in trees or fruit from those not so protected."
Julius Harris, *Ridgeway.*	Sandy loam.	W.	About 5 miles So. L. Ont.	Apples and Peaches.	Natural forest.	Next the windbreak, trees less thrifty and apples fall more and earlier.
Geo. Catchpole, *North Rose.*	Same level as adjoining land-Sandy and clay loam.	W.	About 5 miles So. L. Ont.	Apples and Peaches.	Natural forest on East, North and West.	"The more windbreaks, rail fences, brush and other matter, the more insects."
Oscar Weed, *North Rose.*	....	W.	About 5 miles So. L. Ont.	Apples.	Natural forest on West.	"The trees along the woods for several rows were more infested with worms than the balance of the orchard and bore less fruit."
C. H. Hess, *Castile.*	Somewhat elevated. S. & E. exposure. Gravelly loam.	W.NW.	Inland About 4 m. S. of Silver Lake.	Apples.	Natural forest on North&North-West.	"It has been very noticeable that the fruit grown on the part of the orchard toward the piece of woodland is always wormy, knotty and inferior, never suitable for barrelling."
N. J. Edmunds, *Brockport.*	High. Sandy loam.	W.	About 10 miles S. L. Ont.	Peaches and Apples.	Natural forest.	"The best results in both apples and peaches were where the trees were most exposed to the wind and sun, and the poorest within ten rods of the forest."
M. F. Varney, *North Collins,*	....	SW.	About 8 miles East L. Erie.	Grapes.	Natural forest.	"Have noticed some times that grapes do the best where the wind is least broken."
W. G. Ellwanger, *Canandaigua.*	High.	W.SW.	On Canandaigua Lake.	Peaches.	....	"I find that for peaches it is the best to have no protection."

5.—DEFINITE OBSERVATIONS ADVERSE TO WINDBREAKS.

OBSERVER.	Site and Soil,	Direction of Prevailing and severest winds.	Location in reference to large bodies of water.	Kinds of fruit observed.	Kind of windbreaks observed.	INJURIES OBSERVED.
W. Hopkins, *Lewiston.*	In general.	W.SW.	On Niagara R. about 8 miles So. L. Ontario.	Apples and Peaches.	In general.	Fruit more wormy.
J. A. Root, *Skaneateles.*	In general.	....	On N. end of Skaneateles L.	In general.	In general.	"Late spring frosts do far more damage to grapes, peaches, etc., in a protected location than where the wind has free play."
A. S. Dyckman, *So. Haven, Mich.*	High. Sandy.	W.SW.	On east shore of L. Michigan.	Peaches.	Natural forest.	"More frosty."
Members of Grand R. Valley Hort. Society, *Grand Rapids, Mich.*	High. Gravelly.	W.	About 25 miles East of Lake Michigan.	Peaches.	In general.	"W. N. Cook, Chas. W. Garfield, S. M. Pearsall, and John Pailow, were all agreed that windbreaks are not desirable, as a cold wave is likely to settle down on trees when immediately under the shelter, which those farthest away have escaped.
W. N. Cook, *Grand Rapids, Mich.*	In general.	W.	About 25 miles East of Lake Michigan.	Peaches.	In general.	"In the summer following the cold winter of 1872-3, I travelled over a large part of Kent and adjoining counties, and closely observed the influence of windbreaks. Wherever peach trees were situated on the east side of such timber belts, they were all killed, and the Baldwin apple fared little better; while on exposed places of the same elevation, the trees were alive and often bearing fruit. I saw several peach orchards with protecting thickets on the east, and they were uninjured."
J. A. Pearce, *Grand Rapids, Mich.*	High.	SW.	Ab. 25 m. E. of L. Michigan.	Peaches.	....	Treeskilled by cold winters next the windbreak.
J. F. Fitzsimmons, *Hillsdale, Mich.*	....	SW.W. NW.	Inland.	....	Natural forest.	"Have known orchards protected by woods on NW. and W. to do well, and have known them to do equally well without protection. Do not believe that a single windbreak is of any advantage."

II.—PROPER LOCATION AND MANNER OF MAKING WINDBREAKS

I.—*The Location.*

The answer to this printed question must vary greatly with circumstances and with the kind of fruit. Some localities are greatly exposed to prevailing winds; others are screened by hills or sheltered in depressions, and do not need screens. But our hardiest fruits are better off with some protection.—*J. J. Thomas, Union Springs.*

Where we have occupied grounds with a western exposure, we have usually planted lines of Norway spruce on the western border. * * * How to avoid the severity of the west winds has been a constant study with us.—*Patrick Barry, Rochester.*

Wherever the orchards or small fruit plantations would otherwise be exposed to strong winds.—*W. T. Mann, Barker's.*

Where the wind has a sweep of a mile or more.—*B. W. Clark, Lockport.*

Under all circumstances with which we are acquainted, peach trees should not be planted nearer than five rods from a dense windbreak, or the drifting snow will break them down. Apple trees may be planted some nearer.—*Geo. W. Dunn, Pierce's.*

Should plant windbreaks for all fruits except apples. No telling the good a windbreak will do.—*C. H. Perkins, Newark.*

Where there is a long exposure to west and south-west winds.—*A. I. Hulett, Rochester.*

Under all circumstances where ground is exposed to severe winds.—*Irving Rouse, Rochester.*

In all bleak locations; also to a moderate extent as ornaments and for general protection.—*S. C. Davis, Medina.*

Where an orchard has a northern and western exposure.—*E. B. Norris, Sodus.*

1st. Where it is impossible to get a good exposure; 2d, where fruit is planted which is especially liable to loss from wind, as King apples or Duchess pears.—*H. J. Peck, Seneca Castle.*

Upon a site that is exposed to a cold and bleak north or west wind.—*C. W. Pierson, Waterloo.*

Where orchards and fruit plantations are so situated as to be exposed to cold bleak winds; in fact, in all exposed places I have no doubt windbreaks are very beneficial.—*Anthony Lamb, Syracuse.*

On all elevated, exposed locations, in order to hold the snow more evenly over the land and to prevent the evaporation that takes place rapidly with a high wind. Also to furnish nesting places for birds.—*Geo. T. Powell, Ghent.*

In all windy places.—*D. Bogue, Medina.*

Where the wind is very severe, a windbreak on the north and west would be very beneficial.—*Wm. C. Almy, Dundee.*

In exposed places where sandy ridges are liable to blow away.—*A. S. Dyckman, South Haven, Michigan.*

I would set nut-bearing trees on the north and west of all fruit orchards, for protection and for the nuts.—*S. M. Pearsall, Grand Rapids, Michigan.*

Where the snow blows off.—*Geo. C. McClatchie, Ludington, Michigan.*

I would recommend them wherever land is exposed to raking winds, first for retaining snows on the ground; second, to protect fruit from winds.—*J. F. Taylor, Douglas, Michigan.*

In my situation I should want the windbreak some forty to eighty rods from the orchard on the west, and extend to the north. Do not think it would be safe to plant one close upon the west side of my orchard, for fear of still air settling down over the break.—*H. H. Hayes, Talmadge, Michigan.*

For all small fruits especially, for all soils and localities.—*J. N. Stearns, Kalamazoo, Michigan.*

Where the land slopes to the prevailing wind. Should want it only high and thick enough to break the force of the wind, not to produce a dead calm. —*R. J. Coryell, Jonesville, Michigan.*

In all exposed situations.—*L. D. Watkins, Manchester, Michigan.*

Would plant my hedge on the side where most exposed to high winds.—*J. Austin Scott, Ann Arbor, Michigan.*

Wherever the grounds are exposed to the south and west winds.—*D. G. Edmiston, Adrian, Michigan.*

2.—CHARACTER OF A GOOD WINDBREAK.

We have usually planted lines of Norway spruce on the western border. Sometimes a line of European larch is planted with the spruce. These and the Scotch and Austrian and white pine are all good for windbreaks.—*Patrick Barry, Rochester.*

Evergreens are certainly preferable to deciduous trees. Judging from observation, Norway spruce in single row planted two feet apart is best.—*W. F. Mann, Barker's.*

We should recommend the Norway spruce planted in a single row from six to eight feet apart, or set four feet and every other one removed in a few years. If the location is much exposed, we would recommend a row or two of maples on the windward, set from eight to ten feet apart in the row, the rows being from ten to fourteen feet apart.—*T. G. Yeomans & Sons, Walworth.*

The best kind I ever used or saw, was a good Norway spruce hedge set close enough together to make a tight break, and trimmed back until they had formed a tight hedge, at least ten feet high.—*E. B. Norris, Sodus.*

I do not believe that a solid windbreak would be desirable, as a circulation of air is necessary. We need only to break the power and force of the wind.—*Geo. T. Powell, Ghent.*

Evergreens.—Norway spruce, Austrian pine, Scotch pine, etc., planted in wide belts and not too close, but irregularly, something like nature.—*A. Hammond, Geneva.*

Something tall but not too thick, that will allow a free passage of wind, but moderate its force. I have some faith in Lombardy poplar trees for this purpose. —*A. S. Dyckman, South Haven, Michigan.*

Norway spruce every time, set four feet apart. Keep well sheared and you can have a perfect hedge as high as twenty or even thirty feet.—*J. Austin Scott, Ann Arbor, Michigan.*

GENERAL SUMMARY.

1. A windbreak may exert great influence upon a fruit plantation.

2. The benefits derived from windbreaks are the following: protection from cold; lessening of evaporation from soil and plants; lessening of windfalls; lessening of liability to mechanical injury of trees; retention of snow and leaves; facilitating of labor; protection of blossoms from severe winds; enabling trees to grow more erect; lessening of injury from the drying up of small fruits; retention of sand in certain localities; hastening of maturity of fruits in some cases; encouragement of birds; ornamentation.

3. The injuries sustained from windbreaks are as follows: Preventing the free circulation of warm winds and consequent exposure to cold; injuries from insects and fungous diseases; injuries from the encroachment of the windbreak itself; increased liability to late spring frosts in rare cases.

a. The injuries from cold, still air is usually confined to those localities which are directly influenced by large bodies of water, and which are protected by forest belts. It can be avoided by planting thin belts.

b. The injury from insects can be averted by spraying with arsenical poisons.

c. The injury from the encroachment of the windbreak may be averted, in part at least, by good cultivation and by planting the fruit simultaneously with the belt.

4. Windbreaks are advantageous wherever fruit plantations are exposed to strong winds.

5. In interior places, dense or broad belts, of two or more rows of trees, are desirable, while within the influence of large bodies of water, thin or narrow belts, comprising but a row or two, are usually preferable.

6. The best trees for windbreaks in the north-eastern states are Norway spruce and Austrian and Scotch pines, among the evergreens. Among deciduous trees, most of the rapidly growing native species are useful, A mixed plantation, with the hardiest and most vigorous deciduous trees on the windward, is probably, the ideal artificial shelter belt.

L. H. BAILEY.

FORESTRY FOR CANADA.

BY H. G. JOLY DE LOTBINIERE.

The forest does not only supply the invaluable commodities of fuel and lumber, it exercises a great influence on the climate, and on agriculture. If science has not yet admitted that the presence of forests increases the rainfall (by condensation of vapour held in the atmosphere, owing to the lower temperature of the forest land, or by other means) it is universally admitted that the forest regulates, throughout the year, the distribution of water in our streams, contributes to retain the moisture favorable to vegetation, retards evaporation, and checks the effects of drying winds.

Unfortunately, it is only after the forest is gone, that its value is truly appreciated, as in the south of France, Spain, Italy, Greece and many other countries, once fertile, now barren and unproductive. The two great extremes, long drought and disastrous inundations, are due to the same cause, viz.: the wholesale destruction of the forests, especially on the mountains, the birthplace of the streams. The soil of many a fertile valley is now hidden under a thick bed of sand, gravel and boulders (as we often see in Switzerland) brought down by torrents from the mountain slopes, where the trees which once retained the ground with their roots have been destroyed. The rain, instead of soaking gradually through the moss, vegetable mould and roots, and feeding, by degrees, the springs and streams, as it did while the forest lived, rushes down to the valleys below, as it falls, as from the sides of a roof, in irresistible torrents, carrying with it the ground that nothing now retains on the steep mountain side.

It is most interesting to follow the work of re-afforesting carried on, principally in France, on the Landes for nearly a century, and on the barren mountain slopes, and to notice their beneficial results. The efforts of the " Ligue du Reboisement de l'Algeria" to repair the harm done in Algeria, by the burning of the forests on the slopes of the Atlas, deserve the warm sympathy of all those who can appreciate perseverance and devotion to the public good.

But the subject before us to-day, is "Forestry for Canada." It is difficult to awaken any interest in the question among us. We are apt to consider Forestry as a superfluity, here, as if our forests were inexhaustible. They would be so (saving accidents by fire) with judicious management and sufficient protection. The aim of Forestry is not, as many believe, to preserve trees forever, or until they decay and fall. Quite the reverse; it is to select and cut down every tree ripe for the axe, making room for the young growth, and thereby insuring a continued reproduction and a steady revenue. As it is, we are not only spending our revenue, we are drawing largely every year upon our capital.

The pride of the Canadian forest, the white pine, is getting very scarce; the proportion of first-class wood is decreasing year by year, while the distance from which it is brought is increasing. How many mill owners, who would have scorned sawing spruce logs a few years ago, are only too glad to get them now, and though spruce reproduces itself much more readily than pine, we can foresee the time when it will get very scarce, at the present rate of cutting.

The late James Little, of Montreal, who was the first to sound the alarm, deserves to be gratefully remembered by Canada. When every one treated our pine as if the supply were inexhaustible, he was the first to call attention to its rapid disappearance. His warnings were met, not only with indifference, but with ridicule. Now, the eyes of the most sceptic are opened, and they must admit that he was right; but it is sad to see them turn around now and affirm that it is no use devising means for the protection of our forests, because there is nothing left in them worth protecting. There is still a great deal left worth caring for and improving. It is late, but not too late.

It is a good sign to find in the Dominion Statute Book, 47 Vict., cap. 25, sec. 5, proof that the importance of preserving the forests on the Rocky Mountains is well understood. The Governor-General-in-Council is empowered to make provisions "for the preservation of forest trees on the crests and slopes of the Rocky " Mountains, and for the proper maintenance, throughout the year, of the volume " of water in the rivers and streams which have their sources in such moun- " tains."

In the absence of a regular system of Forestry, there are practical means of protecting our public forests which I will now review as briefly as possible.

A careful *classification* of public lands, under two heads: lands fit for agriculture, which alone ought to be open to settlement—lands unfit for agriculture, which ought to be carefully closed against settlement and kept in forest. The best timber lands, especially the pineries, are generally totally unfit for agriculture; it is a cruelty to decoy settlers there. How many hard working men have wasted the best part of their lives in trying to get a living out of such poor soil, and are tied down to it for want of means to move away with their families; the only result of their work being the ruin of a fine forest and their own ruin. The Quebec Legislature had enacted a wise law in 1883, the Timber Reserve Act, which, I regret to see, is on the point of being repealed. As to the relations between the settler and the lumberman, where there is good faith on both sides, those relations ought to be of the most friendly nature.

Strict regulations as to the *minimum size* of logs allowed to be cut, and encouragement to convert trees into saw logs, instead of square timber, which wastes one-third of the tree in the squaring.

Protection against fire which destroys more trees than the axe, precautions in lighting fires in the woods and in clearing lands by fire, for settlement; this last subject is closely connected with the question of the *classification* of lands and keeping of settlers from lands unfit for agriculture. Fires are more to be apprehended in pineries and among resinous trees, where the soil is very often unfit for agriculture, than among hardwood trees where the quality of the soil is much better as a rule. Our Provincial Legislature is now considering a good measure calling on the lessees of timber limits to contribute one-half of the costs of protecting their limits against fires, the Province paying the other half. It is, I think, the law in Ontario.

Creation of New Forests.

It is difficult to compress within the narrow limits of one article all the branches of Forestry. After considering the preservation of existing forests, we cannot ignore the necessity for creating new ones, on the prairies of the North-West and our old settlements, denuded of trees, in the East.

As for the North-West, what we want, first of all, is *practical experience.* Many theories have been propounded to explain the absence of trees on the prairies, and Mr. A. T. Drummond, of Montreal, a zealous worker in the cause of Forestry, has written some very interesting essays on that subject.

I would recommend the *Ash-leaved Maple*, for the prairies to start with. The rapidity of its growth, its resistance to the drouth, the value of its sap for sugar, which has been scientifically demonstrated by Doctor B. J. Harrington, in a series of experiments, the results of which have been communicated by him to the Royal Society of Canada, in a most interesting paper; all these recommend its culture as a starting point. With that tree plant cotton-wood, poplar, willow, every kind of fast-growing tree, however inferior in quality, so as to start wind screens, behind which slower growing but more valuable trees can be cultivated, and fields of grain sheltered from the baneful effects of the drying winds.

If, in the absence of any serious attempts at forest tree culture in the North-West, we are still puzzled how to proceed there, here in the East, we know beforehand that we are bound to succeed, with proper judgment and care. We know that every soil here, whatever its nature, can grow some kind or other of tree, and that, in many instances, the intrinsic value of the tree is quite out of proportion with the value of the soil: pines on sandy soil; sugar maples on rocky hill sides; ash on cold, wet soil; tamarac and cedar in swamps; white birch on the worst soil and under most unfavorable climate, and, of course, oak, elm, butternut, black birch, &c., &c., in good soil

It appears logical to choose the most valuable of trees for a new plantation, when the nature of the soil admits of it, though we often see valueless willows and poplars planted on the best soil and even in gardens. I have tried the black walnut, which sells for a dollar a cubic foot, in Quebec—nearly the price of mahogany. Trees raised from the nut have given me nuts after twelve years growth, but, as my experiments do not extend over fourteen years, however satisfactory to myself, I cannot yet assert that the success is complete. Certainly it is very encouraging, and, I hope, will lead others to try the experiment, which is not an expensive one.

It is impossible to enter into the details of tree planting now, but there are two points which ought not to be overlooked: in our climate, experience shows that it is better to plant trees in the spring, especially if the soil is in the slightest degree wet or even retentive of humidity, and consequently affected by the frost, and, secondly, it is useless to attempt tree culture *without good fences*, as cattle will destroy all young trees. In fact, there are thousands of spots where the cultivation of the soil has been given up, which, in a few years, would be covered with a growth of self-sown trees, if the cattle were only kept out by fences

The results of Forestry are so far removed, and, at the same time, of such national importance, as to make it incumbent on the Government to encourage it by every means; experimental stations, especially in the North-West, in charge of the Mounted Police and the Indian Agents and teachers, nurseries of forest trees and gratuitous distribution of the same, rewards in land grants or exemptions from taxation; encouraging the observance of Arbor Day, a school of Forestry, or, until that point can be reached, sending some well-qualified young men to study forestry in the French and German schools, and last but not least, educating the people, beginning with the children.

Teach, in all the schools, the elements of tree culture, joining practice with theory, whenever possible. No better way to develop in the child the qualities necessary to his success as a man. He will learn forethought, in choosing the proper season, the soil, the tree; care and patience in digging up and transplanting that tree; perseverance in watching over it, watering it, supporting it, pruning it, cultivating the ground round it; unselfishness, in feeling that he works not only for himself, but that others will enjoy the fruits of his labor.

The article, by M. Joly, from which the above is taken, was much longer, but I have copied the most interesting and the largest part. He objects also, principally I think referring to his own Province, to large sales of lumber limits in advance of the requirements of the market. It should be observed, however, that there often exists especially where large main lines of railroad have lately been run through a country, a good reason for selling the right to cut timber on these lands. They are often in great danger of being over-run by fire. Selling the lumberman the right to cut timber places the forest under his protection. It becomes his direct interest to use every possible means to preserve it from fire. For many years in Ontario, he had little chance, but now, as the Ontario Government pay half the expense of what fire-rangers the lumberman chooses to nominate, the means are ready to his hand. He is assisted, too, by the fact that a large number of these rangers are yearly, in the dangerous season, stationed in forests near his own, thereby rendering the running of fire much less likely.

AN EXAMPLE FROM KANSAS.

The following letter by S. C. Mason, Esq., Kansas, to "Garden & Forest," will be found in many passages interesting and valuable to Canadians. One sentence which says: "A slaughter like this is often made to secure one more field for corn or wheat, and this by a man who has already more acres under the plow than he can bring to one-half of their productive capacity," is peculiarly applicable to Canada, where over many thousand acres, the same class of injurious labor has been performed. Another is equally applicable; "When cattle are not allowed to tramp out the young seedlings for the scanty pasturage furnished by the woodland, the value and profit of Kansas forests will steadily increase":--

KANSAS FARMERS AND KANSAS FORESTS.

SIR,—Though Kansas possesses no timbered area that, for extent or density, will compare with the forests of the eastern or middle states, there is a considerable extent of country along the eastern border which was originally well clothed with trees—in the bottoms a heavy and valuable growth, on bluffs and uplands a scattering stand of scrubby oaks and hickories. Farther west the timbered area is narrowed and confined more closely to the streams, and beyond the junction of the Blue with the Kansas River the last wooded hills are seen. Beyond this point the trees on the slopes of the bluffs disappear, and only the banks of the streams and the lower benches are wooded. Before the head waters of either of our larger western rivers are reached, the last solitary cottonwood or elm will have been passed and the buffalo grass and the blue-stem are masters of the field.

The trees are not keeping their bounds without attempting to acquire territory, and every rod of soil where the fires cannot sweep is sooner or later covered with timber. A bend of a stream nearly surrounding a bit of bottom land affords the best chance for an advance if the fires are prevented from entering from the unprotected side. Where natural conditions or the care of man afford this protection, we soon find those advance guards of forest-growth, the sumach and the dog-wood bushes, springing up among the blue-stem grass. Before long from the midst of these thickets young oaks, walnuts and elms shoot up, and in a score of years form a handsome grove. Out along some narrow ravine or draw leading down from the bluffs the trees push their way, year after year, where fires have failed to reach them. Then comes a wet season, with an unusual growth of grass, a dry day, with the wind in just the right direction, and the fire sweeps down deadening the young growth back nearly to former limits. But the sturdy roots are left alive and the contest is renewed till, at length, the trees overshadow and drive out the grass, and so deprive the fire of fuel.

With the general settlement of the country came the steam saw-mill and the demand for all grades of native lumber, as well as for thousands of loads of stove-wood. Many of the owners of timbered lands, reckless of the future, sold their trees till not a valuable stick was left. The trees that stood upon the land of a non-resident or upon state or school lands were chopped and plundered by day and by night. Cases could be cited in some of the western counties where a fine growth of red cedars was so completely cleared from the bluffs that neither stumps nor roots now remain in the chalky declivities to give a hint to the verdure that once covered them. Kansas pioneers dealt with the scanty growth of timber they found with the same reckless disregard for the future which led to the extermination of the white pine farther east. Those who settled first and secured timber claims had more than enough wood for their needs ; the prairie homesteader had none. It is perhaps not just or consistent to blame too severely these early pioneers who came to the state often with little besides the team and waggon which brought them. With the nearest railroad station fifty or a hundred miles away, where pine lumber of poor quality could be had only at enormous prices, it was natural that as much as possible of the native timber should be turned to account. But there is a waste and destruction of young timber taking place to-day against which the warning voice cannot be too earnestly raised. It may sound strange to speak of clearing timber land in Kansas, yet it is a fact that within a single county, during the past few years, many acres of thrifty young timber have been chopped and placed on the market as stove-wood or fence-posts. I have seen scores of young black walnut trees, not thirty years old, split into rails and fence-posts, without a thought on the part of the owner that the supply of merchantable walnut lumber in the east and south is nearly exhausted. and that he was clearing the ground of trees which would be of great value to his children. A slaughter like this is often made to secure one more field of corn or wheat, and this by a man who has already more acres under the plow than he can bring to one-half of their productive capacity.

When the farmers who own the timbered lands make it a rule to cut only matured trees or crowded and imperfect ones, except when needed for special use, thinning judiciously and preserving with care every young tree of a valuable variety ; when timber lands are as carefully guarded from fires as the stock-yards and stables, and when cattle are not allowed to tramp out the young seedlings for the sake of the scanty pasturage furnished by the woodland, the value and profit of Kansas forests will steadily increase.

The future of Kansas forests must rest with Kansas farmers. Give the trees protection from fire and stock, with a little timely thinning and pruning ; cut them as they reach maturity, and provide the way for others to take their places, and the woodlands will grow continually more valuable and yield a return as safe and sure as the best plowed fields.—*S. C. Mason, in "Garden and Forest."*

THE RE-AFFORESTATION OF IRELAND.

Any one who, passing along the Irish Channel, has viewed the bare and desolate appearance of the Irish coast, there presenting a high mountainous range, can easily see how much the country needs the shelter of its ancient forests, of which it has long since been deprived. Every depression, shielded by the hills, is cultivated, but all between, where the wind sweeps unchecked over the land, is a succession of uncultivated expanse, where nothing or nothing but the poorest pasturage exists. The following proposals for re-foresting Ireland will interest my readers—having a direct bearing on the necessity of planting waste portions of land, of which many exist in Ontario :—

At the invitation of the late Dr. Lyons, M.P., though at his own expense, Mr. Howitry, who holds the office of forest conservator in Denmark, examined the resources and the need of Ireland for forest cultivation. He surveyed its mountain ranges, its moors, its lakes, and its rivers. His experiences and conclusions he has embodied in a report to Dr. Lyons, which has been published as a Parliamentary paper. His deliberate judgment agrees with the surmises which had already been formed. Swamps and morasses are created in Ireland from the want of trees to drink up the superfluous moisture. Irish rivers inundate the districts they traverse because there are no forests on the mountain tops to arrest and retain the autumn and spring rains. In summer there is a dearth of water because the trees are gone which would have served each as a reservoir. A tree is advantageous in a double way : it is like a camel in its power of imbibing an enormous quantity when water is abundant or superabundant—like a camel it keeps the store for a time of scarcity. Irish agriculture, by its system of straight drains, which Mr. Howitry entirely disapproves, has acted as if water were poison instead of nutriment. In the past by felling the mountain woods, and in the present by planting no successors, it has done worse by tapping the supply at its source. Irish fruitfulness, he warns the nation, is gradually being drained and washed away into the lakes and seas, and no preparation has been made to replenish it. The folly is, in his estimation, the more inexcusable that the islands presents the especial conditions for rendering forestry easy and beneficial. On the hills the soil is still able to feed all the trees which can be put into it. Out of the 20,000,000 acres in Ireland he reports that there are at least 5,000,000 for the most part waste, which might be planted with a reasonable certainty of profit.

Irish wastes on the mountains and in the valleys are, he considers, of a different order of fertility altogether to the Landes, or the Pyrenean and Alpine slopes, on which re-afforesting is being conducted with indisputable gain. Ireland would, he is persuaded, grow valuable timber, instead of commoner and cheaper kinds. A list, appended to his letter to Dr. Lyons, enumerates 36 conifers, 38 deciduous and hardwood trees, and eight sorts of bushes which could be grown to advantage. The varieties could be selected with regard to the readiest local uses for the wood. He has drawn up from personal inspection an elaborate scheme for planting at least 100,000 acres every year for the next thirty. At the end of thirty years a plantation, he reckons, comes to full productive capacity, without respect to the previous incidental returns from brushwood and saplings. At thirty years of age, he calculates that the cost per acre will have been, at highest £20, the average annual profit at lowest £1. Probably as the demand for timber, of which England yearly imports 290,000,000 cubic feet, is rising, and the area of supply continually narrowing, the profit may be much larger. At present most of the 5,000,000 acres of waste pay not a penny of rent; the residue yields less than sixpence an acre.

SOWING TREE SEEDS.

During the year there have been frequent enquiries from amateurs who wish to grow their own tree seeds, as to the best methods, a piece of information not always easily obtained. The following essay, contributed by one of our most practical Toronto planters, gives such full and exact information as to render it well worthy of publication:—

For this purpose select a piece of land naturally dry, in good clean condition, just such a piece as any good farmer would consider capable of growing a good crop of anything on the farm. The soil *must be* on top a sandy loam. This is absolutely necessary, for this reason: sandy soil is not subject to upheaval by frost as are clay soils. Seeds sprout through a sandy covering easier than through clay, as this last frequently cakes into a hard crust which it is almost impossible for the young seeds to push through unless the crust is broken carefully with the fingers or an instrument—a delicate job, and no matter how carefully done, sure to be fatal to many of the young shoots alike in all nut seeds, which resemble in a measure young beans, and are equally brittle in their formation. Where it is not possible to have a seed bed of a light sandy loam, and a person has to sow on clay, be sure and cover the seed in the drills it is sown in, and fill the drills to the surface with sand brought for the purpose. It does not matter what the quality of the sand is. A sand the same as builders use will answer capitally. A piece of land selected for a seed bed should be deeply ploughed or dug; the surface should be even, and not too flat, so that no water will remain to cause stagnation, among the nuts or seed. When all is ready, make the drills the full width of the hoe, which would be about six inches, and about two inches deep, Now sow the nuts thinly,—large nuts, as walnuts, horse chestnuts, etc., about four inches apart in the row; acorns and smaller ones a little thicker, but as the aftergrowth is about the same, the same distance will answer. Cover evenly with soil, and tread the drill firmly. For sowing tree seeds the feet are as useful as the hands. I place great stress on this treading the soil, as this places the nuts firmly in the land and also makes sure of covering the soil over them. After the drills have been tramped rake the loose soil evenly over all. A proper distance apart between the drills would be twenty inches. This distance gives convenience in weeding and hoeing the drills, as all the cultivation of seedlings must necessarily be done by hand. In reference to how deep seeds should be sown, a safe rule is to place the covering of soil twice in thickness the diameter of the seed, so that while a chestnut would be covered with two inches of soil, a beech-nut would have about an inch, and so on in proportion. There are always exceptions to rules, and what a person should strive to attain is a happy medium. Allowance must be made when sowing the seed for the loose soil to settle so that the seed may be always covered a little more, as the subsidence of the soil will bare the seed more or less. And now I come to the chief factor of success in growing seedlings, and that is mulching. So long as the seed-bed is covered after sowing with a good mulching of any litter, manure, leaves, straw or stalks of any kind, success is certain. As to covering the seeds in the drills, should any mistake be made about not putting enough soil, the mulching will put all right. In fact, seeds sown on top of the ground, if only mulched, will do well. This mulching should be left on the bed till warm spring weather sets in, or an examination of the seed-bed shows the seeds pushing their tender shoots through the ground. Rake the mulching into the space between the drills, where it may be left if of a fertilizing nature ; here it will keep weeds down and the soil moist. If, however, it be of a bulky nature, and might impede the growth of the seedlings, have it removed and commence the cultivation of the seedlings the same as you would a crop of carrots,—hoeing, weeding, etc.

We have now the seeds growing and the first season passed over. In the seed-bed plants of maple, ash, birch, chestnut, elm, and all fibrous-rooted trees, may be left two years ; but as the roots on all nut trees are tap-rooted, it is necessary to take them up the following spring if they make any vigorous growth. If they do not, then you may leave them two seasons, but no longer. Another reason for not disturbing the seed-bed to soon is that very often the seeds lie dormant the first year, and come up the second. The seed of the ash will sometimes thus remain dormant. After two years of growth in the seed-bed our seedlings will be ready for transplanting. As early in the spring as the ground will allow for digging, have the seedlings dug up. They should be assorted into two sizes, the large and the small. With a sharp knife, cut the leading and tap-roots back to within six inches of the collar. Do not touch the tops at all, tie them up in convenient bunches for handling, dip the roots in thin mud, and heel in ground convenient to your work. The best soil to grow all kinds of trees in nursery rows is what is known as a sandy loam with a clay bottom. Select a piece answering that description and have it prepared as for any farm crop, To prepare it properly, it should be summer-fallowed the season previous, but that is not necessary though desirable, as any land in fair tilth will answer. Having it ploughed and harrowed, set the line parallel with the longest way of the lot, if most convenient to cultivate that way. A good strong garden line is the most useful and indispensable article in the planting of trees. The line set, level all inequalities of the soil with the spade under the line, and pat the soil down firmly by striking with the back of the spade on the line. The next operation is to cut out the drill by striking with the edge of the spade parallel with the line run, as it were to split the line. A little practice will make a handy man very expert and exact in cutting the line, as it is termed in nursery parlance. The drill is now dug out a spade wide and the soil put neatly on the opposite bank from the line—the bottom of the drill being evened with the spade as the digger goes on digging out the drill. All is now ready for planting, and the planter, provided with a bundle of plants, stoops and places a seedling neatly against the bank, placing the collar of the root neatly against its edge. Another person at the same time places a spadeful of soil with a quick turn of the spade snugly and securely against the roots of the plant. So the planting goes on, and as the planters get more expert, they can place the plants as fast as a slow walk, as we might say, to use a paradox. The plants want firmly treading and straightening, and the balance of the trench may be filled in and levelled off. A convenient distance for any kind of forest tree in the row would be one foot apart, and the distance between rows, four feet. This allows cultivation with cultivators and single plough by horse and man, and is in every way convenient for growing trees straight and in good shape. Out of these rows the trees may be transplanted at any time, spring or fall, to other places, or if the idea is to leave them there permanently they will succeed. After growing three or four years, every second tree may be dug up and transplanted. After four or five years' growth every second row may be removed entirely, thus leaving the rows eight feet apart, and trees two feet apart in the row. In this arrangement on fair soil the trees may be left to grow to form timber or wood. The strongest will now survive, and any weakly ones can be removed at the option of the cultivator. I again repeat that very little experience, with an observant mind, will soon teach a person how to grow and manage the trees for forest cultivation. Before mentioning anything further connected in a general way with tree growing, I will return to group No. 2, consisting of elms and maples, ripening their seed in June. As soon as these seeds are beginning to flutter to the ground the main crop will be found ripe enough for gathering. As these two trees are two of the most important classes of trees we have in our whole list of forest trees, having so many qualities in the value of the timber for firewood, lumber and every other use to which these useful trees may be applied, the importance of their position in the landscape of the country, and many other qualities, had we time to mention them, it is a great blessing or boon to know that they reproduce freely from seed, also that the trees bear great quantities of seed, also that they ripen early in summer, in time to allow of the seed being sown there and then, and that it grows the same season, making a foot or more of growth the one season. The same directions as mentioned before are now applicable to the elm and maple seeds. I must repeat, when sowing the seed be sure and tread it in firmly —the same distance apart in the rows, and after cultivation, as mentioned before in connection with transplanting, etc.

GENERAL CONSEQUENCES OF THE DESTRUCTION OF THE FORESTS

By Mr. Marsh.

With the disappearance of the forest, all is changed. At one season, the earth parts with its warmth by radiation to an open sky—receives, at another, an immoderate heat from the unobstructed rays of the sun. Hence the climate becomes excessive, and the soil is alternately parched by the fervors of summer and seared by the rigors of winter. Bleak winds sweep unresisted over its surface, drift away the snow that sheltered it from the frost, and dry up its scant moisture. The precipitation becomes as regular as the temperature; the melting snows and vernal rains, no longer absorbed by a loose and bibulous vegetable mould, rush over the frozen surface, and pour down the valleys seaward, instead of filling a retentive bed of absorbent earth, and storing up a supply of moisture to feed perennial springs. The soil is bared of its covering of leaves, broken and loosened by the plough, deprived of the fibrous rootlets which held it together, dried and pulverized by sun and wind, and at last exhausted by new combinations. The face of the earth is no longer a sponge, but a dust heap, and the floods, which the waters of the sky pour over it, hurry swiftly along its slopes, corrying in suspension vast quantities of earthy particles which increase the abrading power and mechanical force of the current, and, augmented by the sand and gravel of falling banks, fill the beds of the streams, diverts them into new channels and obstruct their outlets. The rivulets, wanting their former regularity of supply and deprived of the protecting shade of the woods are heated, evaporated, and thus reduced in their summer currents, but swollen to raging torrents in autumn and in spring. From these causes, there is a constant degradation of the uplands, and a consequent elevation of the mineral and vegetable matter carried down by the waters. The channels of great rivers become unnavigable, their estuaries are choked up, and harbors which once sheltered large navies are shoaled by dangerous sand bars. The earth, stripped of its vegetable glebe, grows less and less productive, and, consequently less able to protect itself by weaving a new network of roots to bind its particles together, a new carpeting of turf to shield it from wind and sun and scouring rain. Gradually it becomes altogether barren. The washing of the soil from the mountains leaves bare ridges of sterile rock, and the rich organic mould which covered them, now swept down into the dark low grounds, promotes a luxuriance of aquatic vegetation that breeds fever, and more insiduous forms of mortal disease, by its decay, and thus the earth is rendered no longer fit for the habitation of man.

GERMAN FORESTRY.

A writer in *Woods and Forests,* London, England, speaks thus :—

I have observed that the Germans, though they have a vast growing population, nevertheless have preserved most carefully all the forests on their principal hills, that is to say, in the upper basin of the Rhine, of the Elbe, and in many other places. Their forest preservation is a model for all other nations They do it not for climatic reasons, but for the preservation of the national wealth. The same remark applies in Eastern France, that is to say, to the Vosges Mountains, in the arena which was the scene of the Franco-Germar War. There is also Nancy, which is the great forest school of France. I am not here in any way to pronounce a defence of or a panegyric upon the administration of the late Emperor Napoleon the Third, but whatever may have been his faults of ambition, nevertheless he was one of the first men in France to introduce a system of sound forestry in that country. This has been done in Eastern France for the preservation again of the national wealth, rather than for climatic reasons. Now I have referred to three countries—Scandinavia, Germany, and Eastern France, all of which maintain their forests for the national prosperity, and for the supply of the markets of the world. It is very lucky for us in Great Britain that there are such sources of the supply of foreign timber. We get our timber, as you know from Scandinavia and Canada.

The art of Forestry is cultivated in some other countries I am about to mention, not only for the augmentation of the national wealth, but also for the sake of preserving the moisture and fertility in the soil, and for maintaining a temperate climate. For ensuring a temperate climate to the inhabitants, the first to be mentioned is Southern France. The guide-books most familiar to tourists tell of the immense injury wrought in Southern France by the destruction of the forests which used to exist there. In consequence, the ground has been washed and carried away, and barrenness succeeds to fertility. Then you have long periods of drought, followed by floods and inundations, many of them being greatly destructive of life and property. This has notoriously been the case in Southern France, as it has also been in Italy and in Spain. I fully believe that the destruction of forests in Spain is as great as anywhere in Southern Europe.

We know that Russia is a country of forests naturally. But if you travel there you will find that birch forests have largely succeeded to the pine. This means that where pine forests have been cut down without any provision for reproduction, birch forests grow up. Whenever you see a birch forest there, you will know that a reckless, unscientific felling of pine trees has occurred. This has, no doubt, affected the climate; the alternation of drought and flood is more frequent than it used to be between Moscow and Odessa. Come to the next neighboring country—Turkey. Around Constantinople the destruction is patent to all travellers. Upon both shores of the Bosphorous the population has hardly a stick to bless itself with. Then sail down to the Levant. It was once the scene of the greatest events, and a region most blessed with wealth and fertility. It is now merely a shadow of what it was. The harbor of Ephesus has been dried up from the silting caused by deforesting on the adjacent hills; and crossing over to Cyprus, one of the latest regions to pass under British sway, there again you hear of nothing but destruction of forests. The goat-herds of Cyprus have carried the day, and innumerable goats are still allowed to browse upon the young plants with but little restriction; and the sylvan glories of Cyprus are now departed and merged into darkness. Then again, cross over to Syria, the opposite shore, and you hear the same story there. Where now are the famous cedar groves which existed in the days when Hiram sent timber to Solomon in Palestine? There are only a few clumps of trees to mark what once was there. Where are the oaks under whose shade the patriarchs pitched their tents? Echo answers, "Where?" Only a few remnants remain. I believe the only forests yet remaining within the old sacred limits of Palestine are a few of the Oaks of Bashan. But they are situated on the other side of Jordan, where the hand of destruction cannot reach them. Next pass on to Persia. Why, Persia used to be an enormous Empire, but now-a-days it is a decayed country. Where are no wthe vast populations it used to feed? They have shrunk down to a pretty figure of some seven or eight millions. This is, of course, mainly owing to the destruction of the forests. Alas! the forests are gone, the streams are dried up, and though the old water channels remain, they may be very useful to the antiquary, but are not useful to the political economist.

IMPOVERISHMENT OF LAWN TREES.

The following from an English writer may commend itself to the owners of lawns and parks in and near Toronto. I know no other place where the need of both grass and trees are so glaringly disregarded :—

This is a subject meriting the most serious attention of all planters, and the yet larger numbers that feel an interest in the well-doing of trees on grass. Such trees are impoverished in two ways chiefly, the grass grows at their expense, and they are deprived of nature's annual enrichment in the form of dead and dying leaves, weeds or grasses. The results of these compound robberies of the roots, prove most disastrous to the trees. So marked, often are these starving effects that by the time the trees reach middle age, or stature, they have begun to look prematurely old, or have already given way under disease; moss or lichen have crept up under their limbs and branches, adding, it may be, a new beauty to some trees, but also providing snug lurking places for insects, and inviting the attacks of disease. True, ungenial or wet soils may often bring trees down into similar states of decrepitude or premature old age, but for every tree that becomes diseased or dies through ungenial soils, a score or more perish of sheer starvation. Of course, on good soils the process is slower, as the roots bore deep and run far; but no soil can thus keep on giving out its goodness day by day, month by month, and year by year, and receive nothing in return without becoming finally exhausted. As if these two main causes of impoverishment were not sufficiently mischievous, not a few cultivators still further worry their trees at top, and impoverish their roots at bottom, by the weekly shaving off and carrying away of all the grass that grows under them. The grass is grown largely at the expense of the roots, and, were it left to decompose where it grows, this would partly recoup them for its production; but the incessant mowings and removals prove double drains on the soil; the removal of the crop baulks nature's effort to compensate it for its production.

Fallen leaves were certainly meant to protect and feed the roots of trees. The quantity that falls, even in the case of conifers, is wonderful. Under some of our trees, such as Pinus insignis and Sabiniana, barrow loads of needles might be gathered up yearly. Left where they are, they prove an impenetrable barrier to frost. As to their unsightliness, very few of them will be seen by the end of April, and, besides, the lower branches in most cases cover them up from observation. The fallen leaves perform another useful service: they kill or prevent the growth of the grass. By forming a layer of porous dèbris on the surface, the free passage of water to the roots is ensured, while these natural mulchings hinder the evaporation of the moisture or strength of the soil. Of course, the wide spread of the bottom branches of trees likewise assist in most of these useful purposes. They keep the roots from being frozen and protect them from sun scorching or air drying. In any case where it might be undesirable to prevent the impoverishment of the roots by such means, some other methods of recouping them should be devised. There are few better modes than the application of an occasional top-dressing of good soil or rich compost, according to circumstances. Those who prefer a surface of soil should keep it rough and loose. But cocoa-nut fibre refuse is more sightly, as well as far more useful than any kind of earth as a top-dressing for single trees. Some recommend well-rotted farm-yard manure. There is no objection to this for the majority of deciduous trees, though it must be employed sparingly, if at all, for coniferæ. Good loam forms the most suitable top-dressing for these, though, if planted in fairly good soil, and trained and treated as here recommended, their own leaves will generally prove a sufficient top-dressing to maintain them in sufficient vigor and preserve them in robust health. In a garden, all waste soil, such as old potting-moulds, should be saved and used as top-dressing for conifers, it being one of the best tree fertilizers.—F.

There is a park in Toronto which one might think was in the remembrance of the writer when he wrote the foregoing piece. It is not rich land—it never was—it might have been, but every care has been taken, as long as I can remember, to prevent it becoming so. Once it contained many beautiful young trees—a time, I remember, about forty-five years ago. It had a tolerably rich sward of the roughish clumpy grass which sandy land often gives, but that I think is now poorer than ever; while, the trees, that is the pines, which, being now, I should think, about seventy years old, should now be in full rich growth, are dying at the top already, while the deciduous trees are very far from being what they should be.

This has been deliberately done—every year vast quantities of leaves have been piled in heaps and burned, leaving behind, for manure I suppose the managers intended, a thin layer of wretched ashes. The real manure had, of course, gone in black volumes of smoke to the skies. It might have been a beautiful sward dotted here and there with magnificent trees. It is in many parts as bare as a Cumberland side-hill. Why, putting the matter of leaves to one side, they brought manure there by the thousand cart loads. What did they do with it? There was, where beauty most was wanted, in full view of the principal building, a beautiful stretch of low ground backed by an extensive grove. They took all this manure, with a vast amount of other earth, mostly rich, and filled up the hollow level, sodded it over and made the whole thing look as flat as a Dutch garden of the last century. Now, the vast mass of earth and manure with which they perpetrated this piece of vandalism would, if properly spread and mingled with grass seed, have fertilized the whole park, both grass and trees. Nay, if all these years they had simply composted the leaves and spread the compost, that would have done as much for them. But what can you expect? I have seen them in a park near Toronto, which, left alone, would have been a beautiful one, prune—actually prune—beautiful spreading pine trees, sixty feet high, nearly to the top.

INFLUENCE OF ASPECT, WINDS, AND SOIL, ON GROWTH OF TREES.

The influence of aspect upon the growth of trees depends something upon the prevailing winds and other causes. But soil, slope, and other conditions being otherwise the same, we may state the effects of aspect approximately as follows:—

The northern aspect receives no sun, or but obliquely, according to the angle of elevation. The winds are colder and dryer, and generally in the growing season not strong. The soil retains its moisture, and the growth of vegetation is rapid. The trees retain a more regular shape and their tissues are softer. The timber is, therefore, not as strong, but it is very well adapted to manufacturing purposes. The later vegetation on the north slope delays the opening of buds, and reduces the risk from late spring frosts; but from the late hardening of summer growth, some injury may occur from freezing in winter. The snow lies longest on this slope which very materially favors forest growth. The starting of a forest by seeding is more easily secured on a north slope than any other. It was on a northern slope only that forest seeds sown upon the damp snows in the works of replanting the mountain regions of the Alps, by the French Government, were found to succeed.

The eastern aspect receives the direct rays of the sun in the cool morning hours, and the temperature and light are moderate. The winds (in the United States) are often damp, especially in winter, and the trees seldom become loaded with ice, except when the eastern winds are blowing. The soil holds its moisture fairly, and the timber grows well and acquires medium qualities that adapt it to the greatest variety of uses.

The southern aspect receives the direct rays of the sun, and the light and heat are both intense. It is liable to winds and storms and to erosion from rains, because from the heat a protecting growth of herbage is less liable to be found on the soil. The trees have, on the whole, a slower growth and less regular form, but the timber is firm, heavy and strong, well adapted for building and manufacturing purposes. Seeding can seldom be secured on an open exposure to the south in a warm climate, and trees must usually be set and attended with greater care.

On the western slope the sun shines obliquely, but in the hottest hours of the day, and in our Western States, vegetation is most exposed to drying south-westerly winds. The soil is liable to become dry, and timber is of relatively slower growth and of inferior shape, but the quality in the main is good. These differences are often but shades that would, at times, be scarcely observed, especially in isolated hills; but at other times would be strongly marked, especially when a long trend of hills or mountains gave these influences their full effect, and would be most apparent when the slope in this case are north and south, when the differences amount to contrasts that would attract the notice of a casual observer.

To this may be added that the influence of aspect upon the growth of the trees depends in a great measure upon the prevailing character of the winds, as to whether they blow from the sea or the continent, and whether they have been deprived of their moisture by passing over high mountains. It is, therefore, impossible to state a general rule, but, as a general fact, the firs, pines, larch, and birch, prosper in a northern aspect; the locust, beech, hornbeam, and birch on the eastern slope; the oak, maple, and chestnut, on the southern; and the spruce, oak, beech, and hornbeam, on a western one. It is probable that the effect of prevailing winds is more felt than the differences of exposure to the sun, unless the slope be so steep as to shade the surface. The authority last cited notices a difference in quality of the wood, according to the exposure in which it grows. The north-east, east, and south, are the best, and the north-west is the poorest, because trees growing with that exposure are most liable to injury from frost.

The quality of wood is also influenced by climate and by the dryness or humidity of the soil. Timber grown in a soil where there is stagnant water for a part of the year is apt to be of coarse, loose, and spongy texture, and weak and tender as to strength. But if the roots are supplied with sufficient moisture, without excess or deficiency, the wood is dense, hard, and elastic. The best quality of wood is grown on good soil properly drained. Granitic sand or gravel with a subsoil which the roots can penetrate and from which they can obtain nourishment, will often bear timber of fine quality, even where the surface is not profitable for agricultural use. The oak grown in a thin soil upon a flat rock has usually a large percentage of sap-wood and a little fibre. Timber grown in isolated places does not, as a general rule, split as easily as that grown in dense forests. Other conditions being equal; the density of wood grown in the south of France is greater than that from the northern departments. The tropical woods of exogenous families are, as a rule, distinguished by their great weight. This circumstance prevents them from being floated upon rivers unless buoyed up by air-vessels or other means.

STAKING TRANSPLANTED TREES.

Most of my readers can, no doubt, stake a tree properly, but still it is a matter concerning which there is often something to be learned. With whatever you support a tree the bark is likely to fray or chafe at the point of junction. On the other hand, we can tie it so tightly that it can do neither, but then there is the danger in a short time, as the tree grows, of the bandage becoming so tight as to stop the circulation of sap and injure or even kill the tree. My own method, where an ornamental box is built round a tree, has been, inside the box near the top, to put a board across with a hole in the centre larger than the trunk. The inside of this should be protected, or rather bound, that it may not cut the bark, and for this purpose I have found by far the best material to be old pieces of rubber hose tacked to the top of the board, passed through the opening and then tacked again below. Then, as the tree enlarges, draw the two parts of your board farther open and nail them afresh. Of course the board must be in two parts or you could not have got it there.

Let me say a word as to the reason why, especially if the situation be at all exposed, the tree principally needs staking. Say the young tree has been lately planted and has much of a head, which, by the way, it should not have. When the leaves come out the wind will have power upon it. It will then, if not staked, waver in the earth, and this wavering will not be confined to the mere surface of the earth, but will penetrate deeply, shake the roots in the soil and more or less delay the progress of their growth. For the field, of course, less expensive methods of staking than that described above are used. The following article from Mr. Webster, of Wales, describes the method used there, a place where they need them. Coming along the sea-coast there every tree seems to lean:—

Next to careful planting and watering. a matter of the most vital importance, but unfortunately one that is too often lost sight of, is the efficient staking or otherwise securing of large transplanted trees. The great strain and consequent damage to the roots of large transplants when allowed to rock about with every gust of wind, is not only highly injurious, but in viewing the matter from a point of neatness, few things in forestry have a more unsightly or neglected appearance than trees almost blown over by the wind.

Various are the methods usually adopted in staking or tying newly transplanted trees which, as no hard and fast lines can be laid down, as a rule, must to a great extent depend on the size of the plant as well as situation and exposure, thus a tree four feet, six feet, or even eight feet in height may, in a low-lying sheltered situation be perfectly safe, without stake or tie of any kind, whereas another of a similar size growing in an open situation and exposed to the prevailing winds of the district, will require a mooring of the most secure description, and adjusted in the most efficient manner.

For trees and shrubs up to six feet in height, a strong sharp-pointed stake should be driven firmly into the ground within six inches of the main stem and on the most exposed side. The stake may be from four feet to five feet in length, and should never be driven perpendicularly but with the top slightly inclined from the tree and in the direction from which the prevailing winds blow. A stout ligature of some kind, such as tarred rope or thick bass matting, is then passed around the stem of the tree requiring support, at from three to four feet from the ground and made fast to the stake at a similar height. By crossing the tie between the tree and stake a more efficient job is performed, as there is then less room for the tree to work in when rocking with the wind. It will thus be seen that the nearer the stem of the tree the stake is placed, the greater the power of resistance will be. Some may object to this method on the ground that driving a stake so close to the stem must injure the roots, but this is an error, as when the stake is well pointed and carefully driven the damage is inconsiderable, and will be found so by trying the experiment. The above method has been in force here for many years, and I need hardly add has been productive of the most satisfactory results.

When the trees or shrubs are over six feet in height and of a bushy nature, stronger moorings than that just described will have to be resorted to, and the following plan we have found suitable for almost any emergency:—A strong band of leather or several plies of tarred rope is placed loosely around the stem of the tree to be staked, and at say three-quarters its height. Some wires (ordinary fencing wire) are then joined to this collar, two on the most exposed side and one on the other, and made fast to stout stakes driven firmly in the ground at a distance from the main stem proportionate to the tree's height.

A. D. Webster.

BIRDS AS DESTROYERS OF INSECTS.

Much has been said against the English sparrow, and I have no doubt he does annoy some horticulturists and pomologists. I am, myself, inclined to think, however, that they have done a much more good than harm. Every spring, indeed, they eat off the tops of my lettuce, but they meddle with no other vegetables, and I easily save even these with a piece of light gauze. As for insects, I have watched one sparrow in an afternoon buzzing along the cracks of my big painted fence and pulling out a dozen spiders successively. Every one remembers the amount of filth the cobwebs used to make—their network crossed every doorway—but they are no trouble now. Then, too, were these measuring worms, they were here by millions, you could not go under a tree but half-a-dozen would try to lower themselves on to you, while they used to swarm over the currant and gooseberry trees. We seldom see one since the sparrows' advent.

But it is not only the sparrow. Our fields and woods were once populated with beautiful little birds, many of them gay of plumage and pleasant of voice. They sat on the rail fences as you walked along, and sung to you from every tree. These birds had certainly not been used to live on grain and fruit, for they had been native in the land long before any one grew either the one or the other. Why could we not have left them alone? The farmer does not think when he sends his boy for the old musket to shoot a few little birds which might possibly in the year do him twenty cents' worth of damage that he is teaching the boy a lesson of selfish greediness which shall induce him to leave the old farm and the old man to their own devices, as soon as he can make five dollars more thereby.

I have never been more disgusted than by seeing the young men of two districts engaging in what they call a shooting match. Each party, during the day, doing their best to destroy the harmless, feathered denizens of the wilderness, till at night every feather counts, and the party who has done most injury to the neighbourhood has won the prize. You can see the game—a heap of little dead birds last morning, beautiful and bright, the chief pleasure of wood and meadow to every sympathetic mind. They are now a bloody and useless heap. But for such selfish tyranny, providence has appointed its unerring punishments

The following is from Marsh—" Man and Nature " :—

" An unfortunate and popular error," says Marsh, " greatly magnifies the injury done to the crops of grain and leguminous vegetables by wild birds. Very many of those generally supposed to consume large quantities of the seed of cultivated plants, really feed almost exclusively upon insects, and frequent the wheat fields, not for the sake of the grain, but for the eggs, larvæ and fly of the multiplied tribes of insect life, which are so destructive to the harvests. This fact has been so well established by the examination of the stomachs of great numbers of birds in Europe and New England, at different seasons of the year, that it is no longer open to doubt, and it appears highly probable that even the species which consume more or less grain, generally make amends by destroying insects whose ravages would have been still more injurious. On this subject, we have much more evidence besides that derived from dissection. Direct observation has shown, in many instances, that the destruction of wild birds has been followed by a great multiplication of noxious insects, and, on the other hand, that these latter have been much reduced in numbers by the protection and increase of the birds that devour them. Many interesting facts of this nature have been collected by professed naturalists, but I shall content myself with a few taken from familiar and generally accessible sources."

The following extract is from Michelet, *L'Oisean*, pp. 169, 170 :—"The *stingy* farmer—an epithet justly and feelingly bestowed by Virgil. Avaricious, blind, indeed, who proscribes the birds—those destroyers of insects, those defenders of his harvests. Not a grain for the creature which, during the rains of winter, hunts the future insect, finds out the nests of the larvæ, examines, turns over every leaf, and destroys every day thousands of incipient caterpillars. But sacks of corn for the mature insect, whole fields for the grasshopper, which the birds would have made war upon. With eyes fixed upon his furrow, upon the present moment only, without seeing and without foreseeing, blind to the great harmony which is never broken with impunity, he has everywhere demanded or approved laws for the extermination of that necessary ally of his toil—the insectivorous bird. And the insect has well avenged the bird. It has become necessary to revoke, in haste, the proscription. In the Isle of Bourbon, for instance, a price was set on the head of the martin ; it disappeared and the grasshopper took possession of the island, devouring, withering, scorching with a biting drought, all that they did not consume. In North America it has been the same with the starling, the protector of Indian corn. Even the sparrow, which really does attack grain, but which protects it still more, the pilferer, the outlaw loaded with abuse and smitten with curses ; it has been found in Hungary that they were likely to perish without him ; that he alone could sustain the mighty war against the beetles, and the thousand winged enemies that swarm in the lowlands. They have revoked the decree of banishment, recalled in haste this valiant militia, which, though deficient in discipline, is, nevertheless, the salvation of the country."

"Not long since, in the neighbourhood of Rouen and in the valley of Mouville, the blackbird was for some time proscribed. The beetles profited well by this proscription; their larvæ, infinitely multiplied, carried on their subterranean labours with such success, that a meadow was shown me, the surface of which was completely dried up, every herbaceous root was consumed, and the whole grassy mantle, easily loosened, might have been rolled up and carried away like a carpet."

TREE SHELTER FOR FARMS.

An English opinion, stated in "Woods and Forests," says: "I quite agree with your remarks last week on this subject. A narrow strip of wood left on the crest of the hills, and on the north and west lines of many farms, would pay a large interest by the increase of the crops which would result from such shelter on the remainder of the farm. Where the woods have been cut away, I think it would pay well to plant these strips, and by good care, to promote their growth as rapidly as possible. Quick-growing species in this case should be selected, such as chestnuts, maples and poplars. I have, for several years, allowed all young trees growing along the fences, to grow. I have trimmed them, and quite a number of them have grown so rapidly, that I have trees which will soon be good to cut for rails, posts or wood. They take no room, shelter the field, and give some shade for cattle."

This opinion is now becoming prevalent in Ontario. In travelling through the country of late years, I find everywhere lines of trees being planted along the road-sides and the dividing fences of farms. So far as this can do it within the next twenty years, we shall see much of Ontario sheltered by lines of trees, and those who have neglected it until then, noticing the undoubted benefits, will be busy planting and regretting the time they have allowed to elapse before doing so. In planting trees along roads, however, it is the opinion of many that they should be confined to the north side, in order that having the south sun they may dry the sooner after rain. Some indeed object to trees along the road or fences either, and would have nothing but wire, to avoid the possibility of snow drifting into the road. It must be remembered, however, that where windbreaks are frequent over the surface of the country, the winds will be greatly checked. It should be remembered also that the shade of the trees in summer is very pleasant while travelling on the roads. Again, the soil is a question of consideration. I remember when my road to market laid through seventeen miles of second growth trees on either side, not tall, but tall enough to thoroughly shade the roads. The shade, however, never seemed to make the roads bad. It was a sandy, gravelly soil, and soon dried up. But the day of dependence on mud roads in Ontario ought soon to pass by. There is plenty of stone and gravel in the country to make good roads, (and once well made they last a long time). I know places in England where the paved stone roads, made by the

Second Roman legion two thousand years ago, have been used ever since, and some of them are good roads still. But there is another thing to be remembered concerning these roads. They pass through a deep forest, which catches and holds the rain. Had they been in the open ground they would have been torn up by floods long ago. Farmers, again, are apt to call themselves too poor to make good roads. In America we are too apt to think that land will last for ever without manuring. The first thing is to get the field rich; the next thing is to prevent the rich land from washing away. Nothing will do this but shelter. It is asked: Why do not the prairie lands lose their fertility? They do lose it. When forty years ago I passed through Illinois and Iowa, everybody thought they would get a hundred bushels an acre of corn. I passed the same fields a year or two since, and they were not getting half that amount. Much of their soil had gone into the Mississippi. They have had plenty of time since to shelter their fields well, but instead, they have made little more than a commencement.

THE FUNCTIONS OF TREE LEAVES.

An English writer gives the following idea, which will be found to have some connection wth the foregoing paragraph:—

"The leaves of trees seem destined by nature, to perform two essential functions; first, strong to inhale during hot and dry weather, moisture from the atmosphere during the night, in order to repair the waste occasioned by the perspiration of the preceding day; and secondly, to receive the juices propelled to them from the root, and, as secreting organs, to prepare and elaborate the sap so received, to fit it for the support and enlargement of all the woody parts of the plant. Hence every branch, according to its size, after appropriating to its own use what is necessary, sends down the residue to the stem and roots for their enlargement, as well as for the multiplication of the roots, which may be proved from the roots of every tree being in the ratio of its branches. Thus every part of the plant acts and re-acts; the branches are augmented by the roots, and the roots by the branches. Pontey, a high authority in arboriculture, and others, consider that the principal use of the leaves is to attract the sap upwards, and that tapering stems are occasioned by branches obstructing the ascent of the sap, and also applying it to their own use, thus preventing the enlargement of the stem upwards; so that, according to their ideas, if the lower branches are removed, a greater portion of sap will go to the enlargement of the stem above."

Whoever reads the foregoing paragraph carefully, will understand why rows of trees, though valuable for shelter, never can produce timber. They branch out, as is their nature, and each branch, as is well explained above, prevents the stem from growing so large above itself as it would otherwise do. For this reason, where trees are set closely in plantations, which prevents the growth of the lower branches, the trees acquire a tall, straight stem, clear of knots and making good timber. It becomes, in fact, altogether a different tree. In the open field, by itself, a maple tree will run to about fifty feet in height. It will be thick set, with branches almost from the ground to the summit, and they will spread forty feet. If you come to cut it down you will find very little timber in the tree beside branchwood, which does, indeed, make good fuel. The same tree in a forest or plantation would be without branches, from forty to sixty feet from the ground, after which it would have a spreading head above, and the trunk should yield clear timber all the way to the branches. Granting that the two trees had been planted fifty years, the second should be two feet or more through at its base.

THE BLACK WALNUT.

Many enquiries are made yearly concerning the methods of growing the black walnut, and also as to whether it will flourish in the northern parts of Ontario. The black walnut was, in its native forests, seldom seen much north of the Grand Trunk line. Many, however, have planted it north of that—I have known it to do well near Collingwood. The question, however, can only be solved by the establishment of a plantation—isolated trees give no data whatever. I should not, however, recommend expensive experiments being made with it far north of its old position. In the southern part of Ontario it grows well, but I know of no large plantations. In the States, where the climate was pretty nearly that of our own Welland, I have seen many thousand trees set in plantations ten feet apart. These had grown in forty years to trees over eighty feet in height, thirty inches through at the base and fifty feet up to the branches. They would not make good furniture timber, I was informed, for twenty years more, when it was expected they wonld realize very large sums. The walnuts should be piled in sand or in litter all winter where they will freeze. By planting time in the spring many will have sprouted, which should be planted in one place and those which have not in another. We have many trees in Canada, however, such as the cherry and the ash, which will stand a northern climate much better and grow to valuable timber in half the time.

The following pieces on black walnut from "Woods and Forests," are valuable:—

Having cultivated this tree in Austria, and also witnessed its growth from the present time backwards for sixty years, my mite of information in reference to it may by of some use to such of your readers interested in forest planting. Our stock was raised annually from seed collected from the older trees. They begin to bear in their tenth year. The seed was thrown into a heap to rot the outer fleshy envelope; it was then put into a cellar during October, and placed in layers in moderately dry white sand; but the sand is immaterial, earth answers the same purpose equally well.

In spring, when good planting weather sets in, the seeds were carefully gone over; those that had sprouted were planted in nursery lines, nine inches apart in beds conveniently broad for cleaning purposes, and the unsprouted ones were planted the same distances apart later. In view of frosty nights it was thought advisable to protect the tender plumules with a little dry litter, but the unsprouted ones did not need this protection. The growth the first year would average over 1½ feet in good ground. Early in the following spring the young plants were carefully dug out and planted at distances of two feet between the rows and one foot apart in the rows ; after that biennial removals were sufficient till they were large enough to plant out permanently.

In the case of forest planting we found it to be best to allow the peasants to take over a piece of land intended for a plantation rent free, and cultivate it for two years with maize, gourds, sugar beets or potatoes. This was generally dug with the spade, and kept very clean, thereby bringing the soil into good tilth for the trees intended to be planted. The seed was then put in as before, but at four feet intervals. In average ground, kept clean for the first two years, the trees attained a height of ten feet in five years, and during that time received one pruning off of the lower laterals. With judicious thinning out as time went on the trees grew quickly, and have straight stems which do not branch out into a head much under twenty feet from the ground.

I found that they did well on land flooded annually from a neighboring stream during the months of May and June. They grew equally well on unflooded land, but not in that which was sandy, very dry, or poor in quality. Some of the best timber grew in swampy river deposit with standing water just about three feet under the surface. I may add that the seed should be obtained during the autumn.

Now that the subject of profitable tree planting is creating a good deal of attention in this country, the remarks in "Woods and Forests" respecting the merits of the black walnut will be read with interest by those who are on the look-out for information with regard to the most profitable trees to plant. The following extract from the Chicago *Times* shows conclusively the demand, value, and scarcity of this tree in the States :—

Black walnut has disappeared in two-thirds of the States of the Union in which it was once plentiful. First, Ohio and Indiana were stripped, then Kentucky and Tennessee. The enormous advance in the price of this wood during the past three years attests its scarcity, while parties of men who are going through the States whose trees are gone, pulling up stumps to be used for veneers, show how difficult it has proved to be to find a substitute for this wood, with its even grain, dark finish, and freedom from warping. Cherry stained black has been tried, but no stain lasts, and it is worth noticing that Bouille, the greatest master of cabinet-work that ever lived, utterly refused to work in cherry, and preferred to deal patiently but for all time with the great difficulties of ebony. Until the young walnut groves, which are being planted in all directions, begin to furnish a supply, however, some substitute must be found."

Americans are evidently alive to the want, and have already set to work to plant the tree extensively with a view to meet the continuous and increasing demand, and doubtless at the same time with the idea of a good investment, with a quick and profitable return for capital laid out in planting. It appears that no other timber has been found as yet to be a substitute for this walnut. The above I think is strong evidence that the black walnut ought to be planted in this country freely as a tree for future commerce.

BLACK BIRCH.

"The black birch, which is rapidly coming in favour, is a close-grained and very handsome wood, and can be easily stained to resemble walnut exactly. It is just as easy to work, and is suitable for nearly, if not all, the purposes to which black walnut is at present applied. Birch is much the same color as cherry, but the latter wood is now scarce, and consequently dear. It is difficult to obtain cherry at fifty dollars a thousand feet, while birch can be had at any saw-mill at very much less indeed. When properly stained, it is almost impossible to distinguish the difference between it and walnut, as it is susceptible of a beautiful polish, equal to any wood now used in the manufacture of furniture. There is a great difference in the wood of different sections. Where the land is high and dry, the wood is firm and clear, but if the land is low and wet the wood has a tendency to be soft and of a bluish colour. In all the northern regions it can be found in great abundance, and as the tree grows to such a great size, little trouble is experienced in procuring it in large quantities.

The foregoing, from a Toronto paper, is correct in most particulars. Birch, however, as I have seen it in many a northern forest, is in no such abundance as the woods to which in other days we used to apply that term. The woods yet remaining to the north are not such as we destroyed to make our Ontario farms. For instance, I have seen many a maple forest—many a long stretch where nothing grew but beech, but I never found a forest of birch. In the northern regions, say near the Magnetawan, or in the Nipissing Territory, you will every here and there meet with an immense birch tree—nothing like the small spreading birch trees we see in streets or parks, but three feet or more through the trunk, and rising to a great height. Much might be culled from these forests and should be, as it is mature. One common use to which it is put, which meets every-one's eye, is our perforated chair seats. These are not of one but of three thicknesses, the centre one laid crossways of the grain.

TREES AND RAIN.

"Woods and Forests" gives a short but valuable article on trees and rain :—

"In Italy the clearing of the Apennines is believed to have seriously altered the climate of the Po valley; and now the African sirocco, never known to the armies of ancient Rome, breathes its hot blighting breath over the right bank of the river in the territory of Parma. The similar removal of the pine forests near Ravenna, about twenty miles long, induced the same desolate wind, which continued until the wood had been allowed to grow again. There is no doubt that in France, the removal of the old forests of the Vosges sensibly deteriorated the climate on the plains of Alsace; and it is a historic fact that the ancient destruction of the forests of Cervennes under the reign of Augustus, left the large and rich tracts near the mouth of the Rhone, exposed to the steady violence of the mistral (or north-west wind) before which the area of olive culture has retreated many leagues; the orange is confined to a few sheltered points on the coast, and fruit trees can hardly be reared in places where they were at one time prolific.

The curtailment of the rainfall is a well known consequence of the disappearance of forests. In Egypt, where, during the French occupation, in 1798, not a drop of rain fell for sixteen months, and where from time immemorial, the country has been a rainless bed of sand, Mohamed Ali, by planting his millions of fig and orange trees, has seen his country blessed, with an annual rainfall of several inches."

FORESTRY IN AMERICA.

"It costs a very great sum of money," says an American paper, "to plant and cultivate even a thousand acres of white pine trees, yet a thousand acres of white pine, if planted this year, could not, at the end of half a century, keep a single second or third class mill in Michigan running half a year, so enormous is the consumption of timber in this country. If the native forests, which are sure to disappear shortly unless a different policy is pursued, are to be replaced by forests reared by human hands, vast capital and enormous energy must be expended in the undertaking, our great supply of timber must be drawn from the native forests as long as any native forests remain upon any part of this continent. Hence it is the native forests which demand the attention of legislators and the public. They should be protected to the utmost from destruction by fire; they should be made by law as secure a property to hold as the nature of such property will allow. Great fortunes have been made by holding forest property, and still greater ones are to be made if the danger from fire and the burdens of taxation can be reduced within reasonable limits. Some of the state legislators are already looking after these two things."

What the United States must now look to are are the pine trees of the Southern States, and the Redwood, as it is called, of the Pacific slopes. The great forests of the Eastern and Middle States are so largely used up that many wood working industries, some of which were thought to be secure in a supply of timber for centuries, are proposing to leave them for the South or West.

NEGLECTING YOUNG TREES.

"I have lately, writes a gentleman in *Wood* and *Forest*, been looking over some old bills which I have had from various nurserymen, and am astonished to find the quantities of pines and other specimen trees which I have had from them during these last dozen years; and where are they now? Some few have been destroyed by ground game; but the main quantity having been guarded, where lost, have been choked by the grass and branches. You come upon a suitable place for a specimen and get a pine or a Wellingtonia, as the case may be, out of your little nursery, which no estate should be without, and think to yourself, 'Now, I'll look after this tree and see that it gets fair play.' A couple of years pass and accidentally you tread the same path. Your memory is jogged by seeing either a brown, dead stem, or a poor creature struggling for its life in the midst of a mass of brambles, growing all the more luxuriantly for the stirring of the ground. I intend, in future, to keep a book, enter all specimen trees in it, marked when and where planted, and have them looked to twice a summer."

On all our country roads, and on many a farm, we see young trees to which this will apply. They are not here, however, so likely to be choked with weeds; it is the burning sun and the dry weather which destroy our planted out trees by tens of thousands. Mulching them when planted with straw or litter, held in place by stones, if necessary, or stirring the earth around the tree as wide as the branches, twice in the summer, would save them all.

VALUE OF MOUNTAIN FORESTS.

The following article from the report of J. B. Harrison, Esq., Commissioner of Forests for New Hampshire, applies with much force to some parts of Ontario where we have many mountainous districts of land, as well as many flat districts, or both intermixed, which should be preserved, partly that they are at the head waters of streams, partly that they are mostly of land which, after a few years' cropping, will give little value to the farmer. I have previously endeavored to state most of the ideas given below to my readers, but some years ago, and in this differing style they may be more effective:—

The first and most important function of mountain forests is the preservation of the mountains themselves by clothing them with soil. The relation of mountain forests to the soil out of which they grow is curious and interesting. The soil now produces the trees, but the forest has produced the soil which now nourishes it. There was a time when there was no soil on the mountains of New Hampshire, nor on any portion of the Appalachian system—when the mountains were only ridges, slopes, and summits of bare rock. They were composed wholly of mineral substances, of matter entirely inert and incapable of supplying food to vegetable organisms. There was not an atom of soil on the rocks of the whole region, and no vegetable growth of any kind. Then, when conditions permitted, nature began a new order of things here with some of the lowest forms of vegetable life resembling the lichens of our time. Some of these could grow here and there on the rocks, and whatever could grow would die and decay, but would not wholly perish. Some slight particles of its fibre or substance would remain undestroyed through all the changes of decomposition, and in the course of centuries or thousands of years, a thin film of soil was accumulated here and there, sufficient to nourish vegetation of a little higher character and organization than had belonged to the pioneer organisms.

How great the distance from that far beginning to the first tree! And very poor and inferior trees the earliest ones were when they did appear, compared with those which make our forests now; but they were the best that the still scanty soil would sustain. Ever since the leaves of the first trees began to fall the trees have been slowly adding to the deposit of soil which now covers the rocks, and which has reached the depth and productive potency required to sustain the noble forests of our own time.

The great stratum of fertile, life-producing soil which now lies folded around the shoulders of the hills is the result and accumulation of patient ages of dendral toil. Nature has wrought incessantly, through mighty cycles of time, to clothe the desert rocks with life and beauty, and in the untainted air of these lofty slopes and plateaus she now grows forests which are like the columned aisles of vast cathedrals. Ships which cleave the waves of every sea; and the cottages and palaces of mighty cities, with myriads of structures for man's varied industries, have been builded of materials supplied by our mountain forests. The superior quality of the timber now grown, and the vast quantities in which it is produced, are effects of the wonderful fertility which the soil has attained. It is richer than ever before, but it has not reached the limit of possible productiveness. There is no such limit, indeed, and if our mountain forests were rightly managed they would forever increase in fertility, and the quality of their timber would be thereby gradually improved.

A forest is the only crop, so far as I know, which can be produced perpetually on the same ground without diminishing in any degree the fertility of the soil. It is a remarkable fact that a forest not only does not impoverish the soil out of which it grows, but that it actually enriches it. As the soil is thus improved it responds by producing superior timber. A monntain forest would yield better timber, and more of it, at the end of a thousand years of proper management than at the beginning, and proper management means and includes the cutting of every tree when it reaches its best estate.

Farming in Mountain Regions.

The entire effort at farming in mountain forest-regions in this country is often a most destructive and suicidal mistake. Much of the ground that has been cleared for cultivation in such regions is so steep that if forest-conditions are once destroyed upon it the soil is certain to be washed away. It has always been manifest to intelligent observers that such land is suited to the perpetual production of timber, and of that crop alone. In many instances in our state land has been cleared and "farmed" with very slight returns, which would be much more valuable than it now is if it were still clothed with forest. The yield of farm product in such cases is scanty and uncertain. In some places the land is too high and cold for successful cultivation. There are frosts late in spring and early in autumn, and sometimes in every month of the brief summer, and the soil is soon exhausted. It would be difficult to find anywhere an instance of more obvious natural adaption to the particular function than our whole mountain forest-region exhibits in its fitness for permanent forest-growth and its unfitness for any permanent beneficial use after forest-conditions have been fully destroyed. It would have been much better if some of our "abandoned farms" had never been cleared. In some parts of our country vast values have been permanently blotted out by clearing and cultivating mountain land, and those States will be poorer for all time to come by reason of the resulting destruction and removal of the soil of considerable areas of their mountain regions.

Ruin by Fire.

The most fatal agency in destroying the soil of a mountain forest-country, and in wrecking the mountains themselves, is that of fire, and in the history of most mountain forest-regions the operation of this agency has been closely connected with the attempts to cultivate the soil to which I have just referred. In various regions of the Appalachian mountain system many of the farms have been cleared simply by burning the timber and brush left on a tract after it has been lumbered over, and the first crop is planted in the ashes. In a few years the soil is exhausted or washed away, and the farmer goes a little further up or down the valley, or across the stream which runs through it, and repeats the operation. But the injury to the mountains which is caused by the destruction of the soil of these limited tracts which have been cleared for cultivation is trivial when compared with the losses which have resulted from the forest-fires having their origin in these clearings.

When we consider the rapidly increasing density of the population of our country, and the great advance in the value of all fertile lands, especially in the Eastern States, it is obvious that the complete destruction of the soil of any considerable area is a very serious matter. There are few kinds of losses or misfortunes affecting property which are so calamitous as this. It is a crime against posterity, a permanent subtraction from the wealth and the capabilities of the country. The soil is, to a very great extent, the country itself. A burned city can be rebuilt, and the system of insurance distributes the loss widely. But there is no insurance on the soil of our mountain forests, and when it is once thoroughly burned it will require mighty cycles of time to restore it. Its producing capacity for ages, and all the "promise and potency" of a perpetual succession of valuable crops, are at once reduced to nothingness.—*From the Report of J. B. Harrison, Commissioner of Forests for New Hampshire.*

FORESTS IN THEIR RELATION TO THE PUBLIC HEALTH.*

By Dr. Bryce, Toronto, Secretary Ontario Board of Health.

Mr. President, Ladies and Gentlemen of the Association:—From the earliest times that the phenomena of climate have been observed, we have abundant evidence that the presence or absence of forests has been remarked as producing influences, which have had their effects upon the salubrity of different localities; and, in the warmer countries of Southern Europe and Asia, the deities of the woods and groves stood in high favor with their devoted worshippers.

The people of more recent centuries, too, have not been blind to the protective influence of forests; but it has, until very recent years, been difficult for the energetic settlers who have had to hew out for themselves homes from the forest primeval, to view the sturdy forest trees in any other light than that of their natural enemies.

Indeed, it yet seems hard for us, as we visit our frontier settlements and see the small clearances and limited sources of income which the settler possesses, not to sympathise with him in his struggle for existence, and to view with calm indifference the wanton destruction of the woods, which in older settled portions of the continent, are coming to be looked upon with a regard akin to reverence. To most of us the value of our forests, as direct revenue producers, must naturally appeal first, while to many others their indirect value from the influence they exert on agricultural productiveness will appear important; but few, indeed, have carefully considered how far-reaching are the influences which their existence or their non-existence may exert upon the public health. Some few months ago I had the honor to briefly introduce the subject of "The Preservation of our Forests a National Sanitary Need" to the International Conference of State Boards of Health then in session at Nashville, Tenn., at a time when the levees of the Mississippi were in danger, and when in some of the Gulf States, destruction had visited extensive areas of country. The Conference, and notably those delegates from the South-Western States, realizing the importance of the matter, adopted strong resolutions expressing their views, and forwarded them to Federal and State authorities, urging the adoption of such legislation as would encourage tree-planting in suitable localities over the continent, and thereby serve to mitigate in some degree that destruction of life and property from floods and cyclones, due in large measure, we believe, to the absence of adequate forests on the head waters of many of our largest rivers, and upon the thousands of miles of prairies popularly spoken of as treeless.

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* Read at the meeting of the American Forestry Association, Quebec, 1890.

To further show its active interest in the important work of which this Congress is the exponent, the Conference, through its president, has requested me to attend here as its delegate, and lend to those who are engaged in this praiseworthy work the support of our Association, whose members comprise the most active and prominent sanitarians of the various states and provinces on the continent. In the name, therefore, of the International Conference of State Boards, I am present to-day to offer this assembled Congress greeting, and to offer the active support of this conference of health officers in all measures tending to the abatement, or, at least, the mitigation of those evils which are unfortunately too apparent to all of us.

Engaged some fourteen years ago in lecturing on chemistry and meteorology to the students of the Agricultural College of Ontario, I became greatly interested in the influence on organic vegetable life, of the amounts of rainfall during the months of germination and growth; and being anxious to determine, if possible, the truth of the theoretical teachings of chemical physics, as regards the relationships between soils, trees, and the circumambient atmosphere, I made a careful and laborious study of the tables of the Toronto observatory, beginning with 1840, and for purposes of comparison took the semi-decades of 1840-45, 1850-55, 1860-65, 1870-75.

From the tables which were published at the time in a paper read before the Canadian Institute, several results became apparent.

TOTAL SNOW AND RAIN.

1840-44	216.57	inches.
1850-54	164.684	"
1860-64	160.387	"
1870-74	152.62	"

or, between the first and fourth periods there was a total decrease of 63.95 inches, or a yearly difference of 12.79 inches.

The total moisture is divided as follows:

TOTAL RAIN FALL.

1840-44	191.020	inches
1850-54	137.999	"
1860-64	131.706	"
1870-74	113.150	"

or, between the first and fourth periods there was a total decrease of 77.87 inches, or a yearly difference of 15.35 inches.

TOTAL SNOW FALL (12 inches snow, one inch rain.)

1840-44	322.70	inches
1850-54	320.10	"
1860-64	344.38	"
1870-74	473.83	"

or, between the first and fourth periods there was a total difference of 151.13 inches, or a yearly increase of 12.59 inches.

These calculations agree exactly with theory. In comparing the individual quarters of each period, I arrived at the following results :—March has remained much the same still; with April is found a decrease of more than ½ inch, a decrease that increases with each month until September, thus :—

	April, May, June,	July, August, September.
1840-44	48.55	68.101
1850-54	40.195	48.625
1860-64	32.742	45.617
1870-74	34.670	35.14

The significance of this unpleasant change must be evident to all. The average temperature of the two months of germination is lower now than it was forty years ago. Thus :—

	March.	April.	May.
1840-44	29.88	42.62	51.22
1850-54	30.24	40.06	50.68
1860-64	29.02	40.80	52.86
1870-74	27.24	40.18	53.36

This undoubted fact causes what is termed a late spring, the period for growth and development of the plant being shorter than formerly. The temperature of May, the first month of real growth, is now warmer than formerly, by an average of nearly two degrees. The growth is thus apparently forced unnaturally to make up for loss in April, but the attempt is rendered futile by an undue dryness, the rainfall in May having been :—

1840-44	15.015	inches.
1850-54	13.675	"
1860-64	14.055	"
1870-74	8.640	"

I do not propose to again discuss these figures, further than to say that it is apparent that if the period of germination is made later in Ontario by April becoming colder, and if the month of May, is notably hotter and drier, then that normal development of plants is very materially affected, and results in greatly reduced arboricultural returns. It will further be manifest, however, that those causes, whether of damp soil, cold winds or excessive heat, which are inimical to normal or healthy plant growth, may become the conditions favoring the operation of other influences inimical to plant life, such as vegetable parasites, the poisonous effects of the complex organic products of an aerobic bacterial life in imperfectly aerated soils, of insects, etc., etc. I cannot forbear illustrating this point by referring to a recent paper by Prof. H. Marshall Ward in the proceedings of the Royal Society, " On Some Relations between Host and Parasite in certain Epidemic Diseases of Plants."

He points out what would seem self-evident, "that a plant may vary within very wide limits of the condition we term health." We may, for instance, having a herbaceous plant growing under a high July temperature with an abundance of solar light, when suddenly the temperature falls, rain sets in and the weather remains cloudy for days. Transpiration through the leaves being almost stopped the plant becomes suffused with water and the movements of the absorbed gases are greatly retarded. Now to realize the effects, we have to recognise that the growth of the plant depends upon a healthy condition of its sap, which contains corpuscles and nutritive fluids, which constitute its circulatory system just as much, and in the same sense, as the blood does in an animal. Prof. Ward further points out that the life and growth of the plant depend upon the absorption and assimilation of food, commonly spoken of as metabolism. What thus goes on in the plant depends upon the fact that the cell protoplasm absorbs oxygen brought to it from the water of the soil and from the air, and this oxygen combines with the various compounds contained in the protoplasm. These bodies are thus broken up while others form new unions. Complicated life movements are thus set up, and heat even is developed by the oxygen taking hold of the carbo-hydrates, as starch and glucose, and by the nitrogen absorbed, certain nitrogenous compounds often called, in medicine, the active principles of a plant, as asparagin, etc., are found. A most interesting fact which finds its parallel in the excessive development of acid compounds in the blood of rheumatics and persons suffering from various other troubles, is found in the excessive formation, out of protoplasm, etc., when a lack of carbohydrates occurs in the plants, tissues and sap, of organic acids (such as malic, oxalic, etc.) They are due to incomplete oxidation and their variations in quantity depend greatly on the activity of the metabolic processes and, therefore, on the intensity of respiration.

Remembering that the carbohydrates are formed by carbon dioxide and water meeting in the chlorophyll of the leaves and other growing tissues, and that the activity of the chemical changes depends largely upon certain rays of sunlight, we can in some degree comprehend how the conditions, favorable to vigorous plant life, must in a very special sense be the measure of the resistance which any plant will make to injurious influences. Here, again, we find a parallelism to the resistance which the animal organism offers to malign influences. Housed in dark work-rooms and offices with limited supplies of fresh air or oxygen, we have as a result imperfect assimilation or metabolism going on in the blood and tissues, and so we find that the germs of disease in the shape of vegetable parasites, as diphtheria, obtain an easy victory over debilitated and non-oxidized tissues.

Prof. Ward details at some length how the fungus *Botrytis* develops on many plants, and points out that sunshine is wholly unnecessary to its development, and that dull, damp weather and a saturated atmosphere, so injurious to higher vegetation if prolonged and at a low temperature, are distinctly favorable to the development of these fungi. It has been found further, that the mycelium of the fungus develops a ferment—just, for instance, as the diphtheritic microbe secretes a *leucomaine*, which acts as a poison to the human system—and that the poison possesses the property of swelling and dissolving cellulose, and further seems to kill the protoplasm at the points where the fungus has made its way into the cell-tissues of the plant. The action seems to be associated with the formation by the fungus of oxalic acid, which in excess rapidly destroys protoplasm, and so acting like other acids, causes the leaves of the plant to turn brown. The result is analogous to the effects seen, notably upon evergreens in the neighbourhood of brickyards, where, during the burning, sulphurous products are given off, which being oxidized in the atmosphere, exert an acid action on the soft tissues of the growing wood.

Hence we see that whatever makes for normal growth and development in plants tends equally to enable them to resist the attacks of malign influences.

We find further admirable examples of this in the wheat-rust, the potato blight, black-knot, etc., and in the conditions opposing or favoring their development.

We now naturally must turn and inquire whether we have any analogous conditions which affect climate unfavorably as regards the health of man, and if so, whether the same laws with regard to increased liability to disease become operative. Let us examine these physical influences and effects, which all will agree are largely the result of deforesting. We are accustomed to the use of the terms, (a) *equable, limited* or *insular,* as applied to climates with slight yearly and diurnal variations; and (b) to *extreme, excessive* or *continental, i. e.,* as applied to climates with great variations. As producing these we speak of proximity to extensive water surfaces, height above sea-level, etc. In addition to these classes and others, such as latitude, nature of the soil, etc., we recognise that the covering of the soil plays an important function. Herbage, as remarked by the latter Dr. Parkes, is always healthy, but trees play by far the most important part of any kind of vegetation: (*a*) By keeping the ground cool through directly obstructing the sun's rays: (*b*) By presenting in their leaves an immense evaporating surface: (*c*) By this means taking up through the roots an enormous amount of water, thereby preventing a stagnation of ground water, and aiding healthy nitrification processes by the constant introduction of oxygen into the soil: (*d*) By thereby creating a moist and cool atmosphere around the tree through evaporation, while the same process prevents rapid chilling of the soil by radiation, and at the same time, by the circulation of the sap, a rapid chilling of the tender,exposed parts of the tree is obviated.

We thus have, through the beneficent agency of trees, an equability of climate, obtained in no other way, and in so far as this is a factor favorable to health, we have a distinct advantage to be gained by the preservation of trees.

On the other side, where forests are absent, the excessively rapid changes in temperature, induced by rapid radiation of the earth's heat, affect most unfavourably those exposed to this rapid chilling, and who may not have such strength and vigor of constitution, as to resist its effects. The rapid abstraction of body heat is as inimical to the health of man as of plants, and leaves persons exposed to specific causes, which, under more favorable conditions, are inoperative. Associate with these extreme daily-ranges of temperature, frequent extremes of weather, as of winds and storms, and we have exactly those physical conditions productive of internal congestions, inducing in some form or other, those diseases which hold so prominent a place in our mortality tables. Take but one disease, the causation of which has been long in dispute. Surgeon Major Oldham, of the Indian Medical Service, insists that malaria is due to cold. Logan, in a work on the climate of Chili, tells us that malaria prevails on the table lands, while the lower levels are free from it.

So much then on this part of the influence of trees in preventing a rapid and extreme chilling of the soil and of the atmosphere contiguous to it.

Speaking in the more exact language of to-day, I would say that these gentlemen ascribe to the moisture and cold a condition whereby a cause is given an opportunity of becoming operative by their depressing influences. In other words, the monad, the cause of malaria having entered the system becomes capable under these conditions, of multiplying and overcoming the resistance of the body, just as *Botrytis,* under similar conditions, grows in plants.

Their influence in preventing these rapid and extreme changes, applies likewise in the matter of forests lessening the changeability and violence of the wind.

Dr. Charles Smart, Acting Surgeon General United States army, made some careful experiments on the laws regulating radiation of heat, and other relations thereto of wind and moisture. He says there are three principal factors going to make up climate in its relations to our animal heat, viz.: (1) The absolute temperature of the air: (2) Its motion: (3) The moisture contained in it. The effects of rapid radiation upon the human system, it is assumed by a large school of etiologists, are so great as to produce disorganisation of the nervous mechanism that presides over the temperature of the body, and this upsetting of the heat regulating centre is likely to happen when the body has been subjected, during the day, to extreme solar heats and fatigue, and is exposed after sundown, and in the night to the tropical or sub-tropical chill, which will be severe in proportion to the rapid cooling of the ground, and the amount of vapor condensed in the lower stratum of air.

How notable are the differences in the degrees of radiation of heat from the earth is seen in the statement made by Tyndall in connection with some radiation experiments published in detail several years ago, to the effect that were it not for this invisible gaseous envelope, with its moisture surrounding the earth, it would long ago have radiated its heat to an extent totally destructive to the life of every living organism. All of us are familiar with the old example of how on the desert plains, whose soil may attain a temperature of 150° or more during the day, radiation produces, after sundown, so rapid a cooling as to produce hoar-frost as seen on the blankets of travellers who have laid down to sleep on the sands in the open air.

In the matter of clothing our bodies we find the same laws in operation, and protect ourselves by non-conducting flannel and silk under garments.

It is well to recall what long ago was affirmed, that plagues were stopped in their progression by forests, while there is indubitable evidence going to show that belts of trees have effectually protected communities against the emanations of malarious marshes.

I now propose to speak of an influence exerted by forests, which, studied to some extent, has from the very nature of the case, been but imperfectly appreciated. I refer to their influence, first upon ground waters, and second, as related thereto, their influences upon the processes of nitrification.

Our literature teems, with illustrations of how the never-ceasing and uniform flow of springs celebrated for their curative properties, and presided over by some old-time deity, has been largely decreased by the wanton destruction of the forests which protected their sources; while in Ontario we behold the yearly decreasing volume of the dozen or more splendid rivers, which taking their rise in the central plateau, flow toward some one of the four great lakes, Ontario, Erie, Huron or Georgian Bay.

Towns and cities have sprung up on every side, and as their needs have increased they have looked for local sources of public water supplies, only to find their local streams uncertain in amount during the later summer months, while their decreased volume has resulted in a relatively increased pollution, which makes their use as a source of public water supply, in many instances, quite out of the question. All will see how serious such a matter becomes in its relations to health. But this evil is much more far-reaching in its effects. Assuming that under ordinary circumstances the amount of water which finds its way into the soil is 50% of the total annual rainfall, it will be apparent that if in all parts of the Province, the snows, by the irregularities of the winter season, pass away rapidly, as they now frequently do during a thaw, to the streams and rivers without being taken-up by the then frozen ground; if further during the spring the heat of the sun causes so rapid a melting of the snow, as to make bare the fields in a few days, and fill the streams to overflowing, there results an incalculable loss to the underground sources of supply, which we are coming to look upon more and more as reservoirs, never-failing in their abundance and perfect purity. What such losses mean may perhaps be appreciated when I say that, assuming that six inches of the 25 or 30 inches of annual rainfall are lost by deforesting, we have a direct loss to our underground sources of supply amounting to nearly 100,000,000 gallons per square mile of surface. What this loss means to a city which has to look to driven-wells for its supply will readily be understood, since the more extended that the necessary gathering ground becomes the more expensive does the matter become to the city, whose demands are constantly increasing. Curious as it may appear we see on every side two constantly attendant phenomena, yearly and increasing needs of pure and sufficient water for our cities, and yearly decreasing supplies as regards both purity and quantity. Remembering that it is commonly agreed that more than eighty per cent. of all our typhoid fever is produced through the medium of drinking water; that some 700 deaths and more than 10,000 cases occur in Ontario yearly, causing a loss of labor, of more than 300,000 days, and at least as much more unproductive expenditure of capital, we can understand how from the health standpoint alone deforesting has an economic importance, well-worthy of our most serious consideration. The matter of the loss to the soil produced by the sudden disappearance of the water resulting from the melting snows, and the equally useless and even destructive effects of the torrents which are poured upon the baked and arid surfaces of our fields, by the thunder storms of summer, have another and far-reaching influence in the matter of the retention and utilization of the organic matters of the soil. The vegetable organic matters of our virgin soils, the manures which are deposited on our agricultural lands, depend alike for their beneficial effects, upon whether they are quickly utilized by being converted through the action of the bacteria of the soil into compounds assimilable by plants. Now, upon the aeration and upon the moisture of the soil will depend the rapidity and perfection of the nitrification process. All are aware of how manured or meadow lands often seem to be productive of but little results during a dry summer, and again of how a soil cold and unaerated is equally barren of results. We recognise the reasons of this as two-fold; first, a lack of drainage, whereby the water of the subsoil is prevented from being removed in such a manner as to allow of *aeration* of the soil, and second, from a lack of warmth of soil whereby the bacteria are able to multiply rapidly. A soil left dry after the floods bakes and becomes impervious to air; while its cold subsoil may be so clogged with water, that the bacterial action which goes on is productive only of those compounds which produced by microbes multiplying in the absence of oxygen, are positively injurious to plant-life. Now, when we refer to the effects of forests upon the soil we find that, while they enable the water entangled in the interstices of the leaf-mould and humus, to pass silently into the earth, protected against the scorching rays of the sun, they likewise act in the most positive manner as drains to large areas of surrounding soil. Their tap-roots running downward often pierce retentive clays, and the organic decomposition which goes on in the root fibres creates innumerable drains by means of which subsoil waters are lowered to a notable degree. How great this drainage becomes may be measured by the amount of water which is evaporated by a tree. Parkes and others have given us figures showing an evaporation from the leaves of a tree as equal to 2½ gallons daily, or as given by another equalling 212 inches of an annual rainfall. This evaporation may be best comprehended by imagining it to be at least equal to one foot of water from a surface equal to fifteen feet square.

This removal of ground water, viewed from the public health standpoint, is most important. By drainage or a lowering of the ground water, Dr. Buchanan, president of the Local Government Board of England, has shown that in a few years, the death-rate from consumption in drained towns was reduced nearly 50% ; while everyone is familiar with the story of how, at a Trappist monastery situated on the Roman Campagna, eucalyptus trees planted about it caused a disappearance of malaria from all the inmates except from amongst those whose rooms looked upon a damp inner court. This phenomenon being observed, several eucalyptus trees were planted in the court, when through the drying of the soil by their roots, and a utilizing of the products of normal decomposition of the soil, those conditions favorable to the development of the malarial poison in the soil were removed and the disease disappeared.

This phase of the subject is worthy of much more extended treatment, but time prevents us.

Regarding those direct influences upon the public health, resulting from floods and cyclones, I shall not speak at length. They are patent to all. If there ever were a year when our legislators, our scientists, the people generally have been made aware of how nature, "*red in tooth and claw*," avenges herself on those who despise her teachings, it is the year of grace 1890. I had intended to have made a table showing the disasters from these causes, as collated from the reports of the daily press, but I have forborne. It would have recalled horrors useful only so far as they teach us lessons. Modern science is striving with much success to chain every force of nature to the car of human progress, but it would seem as if the father of the gods resents the violation of nature's laws and this destruction of her sylvan fanes, while the stealing of the fire of the gods by a modern Prometheus results as of old only in the punishment of man. *Sic itur ad astra* seems ever to have as its refrain *facile est descensus Averno*, and to balance the evil and good between these, the lumberman and agriculturist who would subdue the earth, and those, as the sanitarian, the engineer and poet who would maintain inviolate nature's gifts in the trees, is equally the aim and we trust the attainable ideal of such Congresses as this.

"*We trust that somehow good will be the final goal of ill.*"

FORESTRY CORRESPONDENCE.

The following letters and extracts give an idea of the progress of forestry throughout Ontario, and also much valuable experience of the various writers. They were mostly in reply to the following list of questions:—

1. Whether and to what extent lines of trees for windbreak or ornament are being planted, and how those planted are thriving ?

2. Whether plantations of young trees have been set out, and how they succeed ?

3. Whether cattle are fenced out from any portions of forest in your neighborhood, and how it answers ?

4. Any difference in climate, rainfall, drifting of snow, and so forth, you may have observed since the clearing of the country ?

5. What measures, if any, would be likely to improve the existing state of affairs ?

1. A good many, in this neighborhood, are planting trees for wind-breaks and also for ornament. The kinds of trees principally used being Norway spruce, soft maple and our native red cedar. The last named makes an excellent wind-break, as they grow very close ; in this respect they are equal, if not better than the Norway spruce, and are much cheaper. I have wind-breaks on the north

and west of my building and orchard, those on the north being principally soft maple; but, on the west, which is exposed to the severe blasts off Lake Erie, a double row of soft maple, Norway spruce and red cedar. The maples and cedars I get on my own farm, and the Norway spruce from the nursery at Kingsville, only a few miles away. They are all doing very well.

2. I know of only one plantation, that of Hiram Walker & Sons, which was planted last spring at their far-famed summer resort (the Metawas), near the village of Kingsville, on Lake Erie shore; they planted 1,000 trees, principally soft maples and elms, and as far as I can ascertain, they are doing very well.

3. I am sorry to say that cattle are not fenced out of any portion of forest in this neighborhood. I am satisfied it would be a great benefit to the little forest that is left, if cattle were fenced out. I notice that where they are allowed to run in bush pastures, everything in the shape of second growth is completely destroyed, and nothing allowed to grow but the larger timber, which, in a few years, will be all gone.

4. I am told, by old settlers here, that the climate has changed very much since this township was first settled. In those days they knew nothing of the long drouths that we have now nearly every year. What little snow we get is very little benefit to us, as it is all piled up along the fences. Consequently, our wheat fields are left bare and exposed to the hard freezing weather that we generally have in January and February.

5. I have no doubt that tree-planting, especially in belts along northern and western exposures, would be a great improvement.—JAMES H. BROWN, Harrow, Essex Co.

1. A few lines of trees have been planted along roadsides and are doing well. 2. None set out in plantations. 3. Cattle are generally fenced out, and it is a great advantage to the young trees. 4. The snow drifts badly, blocking the roads and leaving the fields almost bare. 5. A compulsory Arbor Day would fill the bill, so far as roadside planting is concerned, each path-master overseeing the work the same as ordinary road work.—JOSEPH GRIFFIN, Crewe, Huron Co.

1. Norway spruce make the best wind-break. There have been four lines of them planted in this section; they grow very well, a little slow at first. 2. We have seen no regular plantations of young trees, but I think young forest trees would succeed well if that the field mice could be prevented from girdling them when young. 3. Cattle are fenced out from some portions of forest. I fenced cattle out from fifteen acres of hardwood bush for about five years and the bush began to grow very thick with little maples, ironwoods, and white ash. 4. No difference except heavier snow drifts in winter resulting from want of protection. —WILLIAM CURRY, Hills Green, Huron Co.

1. I have been planting trees for wind-breaks and find them beneficial—spruce, balsam and others. 2. The trees succeed well. 3. Cattle are not fenced out in Algoma, except in rare cases. N.B.—I lived in Huron County for twenty-five years and found out the benefit of trees around farm-yards and orchards.—WILLIAM HARRIS, Day Mills, Algoma.

1. This section of Western Ontario was more lately settled than most of the surrounding counties, and, therefore, the value of the forests has not been felt until lately. The timber was very fine, consisting chiefly of maple, beech, elm, ash, basswood, oak, birch, and black cherry, in deciduous trees, and hemlock, balsam, and arbor vitæ in evergreens. A large part—too much, indeed—of these woods has been cut down or destroyed by fire. Until lately very few trees were planted on farms in this neighborhood, but now numbers are planted every spring along the roadsides and around the orchards, barns and houses. The

greatest difficulty with most persons seems to be that a large number of the trees fail to grow. The soil is a heavy clay, and newly set trees do not appear to grow so readily as on a lighter soil. I have known men who planted trees and, at least, three-fourths of them did not grow, but it was chiefly through their own carelessness in not taking care of the trees, as others get nearly all to grow. 2. No plantations have been set out as yet. 3. The larger number of farmers allow their cattle, sheep, etc., to run in the woods, but those who "fence them out" soon have a dense undergrowth of young trees and berry bushes growing up, and all are agreed that it is the best plan. In this, however, it is as with planted trees, viz.:—they do better on a lighter soil. 4. Since removing the forests, the winds are stronger, thus causing damage to grain, fences, etc., and also the storms are much more severe in winter. The snow is blown off the fields and laid in great drifts in the hollows and by the fence sides. The drought of summer has also been increased. 5. Many farmers are rather ignorant on this subject and to enlighten them as to the advantages of planting trees, and the necessity for caring for what they do plant would, I think, improve the state of affairs.—James Neilson, Newton, Perth Co.

Some few years since you gave me good advice which was acted on with happy results, but in consequence of most of my young trees being Norway spruce, and very palatable to most farm animals, I could, with hopes of good success, only plant where stock could be kept out of the fields, so planted, altogether, or else go to much expense and trouble in fencing around the trees. However, had I gone to the trouble and expense, to a much greater extent at the time, even had I borrowed the money for the purpose, I should feel better satisfied now. I have about three or four thousand planted out in single, double and treble rows, in places where they are of much benefit to both stock and crops, besides beautifying the farm, most of them having been planted out about twelve years, and these are about fifteen feet high, much admired by any one with any taste for things of beauty, and they are a great prevention against snow drifting of the adjoining roads. 1. There has not been much done by the rank and file of the farmers in the way of tree-planting, but by amateur farmers, such as those who have made money by professions, lumbering, etc., much more progress in that line has been made, and the trees mostly planted have been hard maples (acer saccharinum) which are the kings of deciduous trees for street or roadside planting, and some soft maples and elms.. 2. Very little has been done in this way except by myself, and the success attending what I have done is beyond my most sanguine expectations, particularly where the land had been properly prepared by good tillage, and where grass and weeds were kept down, and potatoes or other root or hoed crops were planted between rows for five or six years, or until the trees nearly covered the ground and were making good headway. 3. In very few places, but in these few, the benefit is very apparent in the prreservation of the forest. 4. Cannot say that the rainfall has been lessened, as the season just passed has been the wettest I have ever noticed, but there has been a marked falling off of the streams and rivers going on for years and still going on. The weather, however, seems to be more changeable, caused, no doubt, by the removal of forests which acted as wind-breaks and barriers in reducing the velocity of the winds and modifying the temperature. The snow drifts, of course, now exist in a most obstructive manner where formerly they were unknown. 5. My idea would be to instruct through the newspapers. 1st. As to the best varieties of trees to plant. It always makes me unhappy to see as I do, in nine cases out of ten, people plant as evergreens "balsams" (Abies Balsamea), almost worthless trees, where they could almost as easily have procured "black" or "double spruce" (Abies Nigra), a splendid hardy native tree, and when well grown, superior, in my opinion, to the best grown specimens of the Norway spruce (*Abies Excelsa*), although of admitted slower growth than the latter, they are closer, more robust, and spread out better. I know where there are two or three specimens of them worth driving ten miles to see—about thirty feet high and with a spread of twenty-five feet. It is equally upsetting to me to see a preference shown to the soft maple (*acer rubrum*) for street and roadside planting, and having it advocated as a more suitable tree than the hard maple (*acer saccharinum*). The Norway maple (*acer platanoides*) is a fine and hardy tree and thrives well in this section of the country.—EDWARD D. NEWTON, M.D., Barrie, Simcoe Co.

1. Trees planted along roadsides more or less every spring, but not to any great extent—seem to be thriving. 2. No, no attention paid to it. 3. The woodlands from which cattle are excluded full of young vigorous growth—none where they run. 4. A great difference in my recollection of fifty-six years—drying up of springs, impassable drifted roads. 5. Government aid to stimulate planting. A general Arbor Day same as for schools. Nurseries of trees furnished at cost by government. New varieties such as larch, Norway spruce, sweet chestnut, etc. Trees furnished to those who send an order. Blank orders sent to any address.—JOHN LE BOUTILLIER, Glen Miller, Hastings Co.

1. In this section, people seem very reluctant in undertaking setting out lines of trees for shelter, several have set out trees for ornament with good success. 2. Question—No, none. But they would be a success if properly attended to. 3. I know of only one or two who shut their cattle out of their woods. In these cases there are lots of young trees from two inches to twelve feet in height, making a thick growth that will in a few years make quite a forest of beech, maple and other hardwood. 4. For some reason the summer is cooler. Rain falls heavier, apparently. Snow drifts are more frequent and heavier since the timber has been cut away. 5. I should say addresses or papers on the subject, read at Farmer's Institutes by some one in a position to answer all questions there at the same time, would have a good effect.—JESSE H. KILLMAN, North Pelham, Monck.

Until the age of twenty-three, my home was in Switzerland, and there, wherever the forest is cut down for any purpose whatever, it is always replanted the next year. 1. In our neighbourhood very few trees have been planted, either for ornament or wind-breaks, but wherever planted, they are thriving well. 2. None whatever. 3. Cattle are not fenced out in any case that I know. The cattle in a forest are a great draw back to its growth, as they brouse the young trees. 4. Much colder, and cold weather is much keener. I am sure that the forests temper the cold; much more drifting when the snow falls. For some years back, we have not had the necessary summer rain, but could not attribute it to the clearing of the forest, though I think that forests draw and keep moisture. 5. To introduce the most valuable forest trees, at the cheapest rate, to parties interested and willing to plant, in different localities through the country; my experience is, that groves of forest through the country would be very beneficial to serial culture.—FREDERICK ALLEMAND, Eden, Elgin Co.

Planted 250 trees along the highway—maple and some ash,—mostly growing well. Almost all the farmers are planting lines of maples along the roads in the older settled parts of our townships. Evergreens make the best wind-break in the winter. Keeping cattle out of the bush would be a great saving to the young trees, but they would have to be thinned out.—SAMUEL KERR, Rockwood, Wellington Co.

1. A few lines of trees have been set out and are thriving very well. 2. I

am not aware of any. 3. Not all the year, for a portion while the crop is growing and harvesting. 4. It appears colder in winter. The snow does not lie on the fall wheat, as formerly. The clover catch is more uncertain. 5. A bonus of a certain amount per acre, when five or ten years growing. One-half paid by the Provincial Government, the other half to be paid by the municipality in which the plantation is situated, and the municipality should have no option, but should be made compulsory as grants to High Schools.

Our forests are being cut down unusually fast these years, for several reasons I shall name. 1. The times are bad for farmers, and those having mortgages or legacies to pay have recourse to the few remaining acres of bush, to help them out of their difficulty. 2. A person purchases a farm with five or ten acres of good bush upon it ; he calculates to sell the wood as soon as possible, to assist him in paying for his farm. 3. A well-to-do farmer intends retiring from the business, and is going to sell his farm, before doing so he makes an auction sale of the standing timber, realizing by this mode of selling, more for his property. 4. A farmer has several sons, he cannot buy farms for all, the homestead is too small to divide between them, the timber is first cut and sold, then the farm is sold and many of them go to the North-West. 5. Farmers who have tried it, say that coal is much cheaper for fuel, so the wood is sold, the interest of which provides coal sufficient for them ; then they have the use of the land as clear profit. Unless some measures are taken towards encouraging planting out plantations, York Co. will be worse than the western prairie, through the foregoing reasons ; for we will not have the rich soil of the west to plant our plantations, and consequently the growth will be slow.—D. James, Thornhill, York Co.

1. In my neighbourhood, trees (principally maple) are planted along farms bordering on the highway, as ornaments only, and in most cases, very poorly done. But the taste for planting is growing and spreading, and young trees are easily obtained. 2. There are no wind-breaks that I know of, except what were reserved at the back of farms for fuel. 3. It seems that the farmers delight to turn their young cattle into the woods during the summer to forage for their *existence* and to the detriment of the very young second growth. 4. The want of more bush certainly causes the snow to drift more than it did before the great clearing, and roads boarded by rail fences are often impassable every winter. 5. People must be taught. Arbor day in Public Schools is a good thing, but a great number of our teachers don't know anything about a tree.

Some years ago, I read a report of yours on forestry with a great deal of interest, and it set me a thinking and talking to my neighbours, and I also planted, and intend to plant more, year after year. More resinous trees are wanted to border our roads ; they are the proper ones for that purpose, while those wanted for timber or fuel should be planted in blocks.—C. H. Peterson, Clifford, Wellington Co.

1. Quite a number of forest trees planted in this section, but they do not succeed well, either from careless planting or too dry summers. The kinds are principally sugar and soft maple. But so far as my observation and experience go, I would advise for forest trees, soft elm, oak, walnut, butternut, sweet chestnut, and box elder, a rapid growing tree, and surpassing the maple for sugar. This tree is pretty scarce and hard to get, but if any person would like to get this kind of tree, which I highly recommend on the account of its hardiness and rapid growth, I will try to get it for them. 2. I have seen no plantations in this part. 3. Cattle are not fenced out of any portion of forest. 4. No material differences in rain, or climate or drifting of snow. 5. Cultivate the

minds of the people, and impress the importance of planting forest trees, such as above mentioned, and evergreens around orchards and buildings.—T. Rickard, Alvinston, Lambton Co.

In some cases cattle are fenced out of pieces of bushland. I myself fenced off about twelve acres of bush, from which nearly all the larger timber had been cut, the surface of the ground becoming sodded with June grass, and what small timber was left was getting stunted or was dying. It is some six years since it was fenced. For the first three years there was no marked change, but since, raspberry canes sprang up and amongst them countless little seedlings, mostly maples. These little trees are doing nicely now, and I hope to live to see a fine young sugar-bush from them. The forest here is growing less every year, yet the rainfall for the last two summers was excessive. So much rain fell that a great deal of the crop, growing on low or level land was drowned repeatedly, and even high land became sour.—John McArton, Carleton Place, Lanark Co.

1. No lines or clumps of timber planted for windbreaks; some little is being done for ornamentation, but not extensively. 2. No. 3. No. 4. Yes, for correct statement of the difference see meteorological reports from Beatrice and Gravenhurst, at the Meteorological Office, Toronto. 5. Our elevated and rocky land is being denuded of its timber. With us many people seem to depend more on what they can take out of the bush, than what they can get out of the clearing to eke out a livelihood, and are stripping the forest of all it contains of any marketable value, without considering for a moment the price they are paying for the crust they get, and are only deferring for a short period the time when they must pull up stakes and quit, or pay more attention to the more legitimate calling of the farm.—John Hollingworth, Beatrice, Muskoka.

1. There have been very few trees of any sort planted out, but what few there are do well and grow very rapidly. 2. No, the forest supply is large enough to supply the demand for ten or twelve years yet. 3. There are but two farmers fence out cattle from the wood, which are growing up with berry bushes. 4. Yes, there is a big difference. The wind gets more of a sweep. There seems to be more thunder storms, and the rains are not so equally divided, causing drouth. The snow does not come so early, but drifts more, and not so deep in the fields. 5. If there were more trees set along the roads and along certain fences over the farms, I believe they would draw more moisture and improve the farms, and they would be a benefit when the forests get a little scarce. I believe it is the farmers' duty to look after the forests for their own interests.—Nicholas De Hart, Creighton, Simcoe.

1. Nearly all new surveys of lots in or near the city have been planted with trees along the streets for ornament, principally hard maple. Our own firm have planted over two hundred trees in this way within the last three years, most of which are doing well. 4. Our winters seem shorter and more broken, the difference in the temperature of day and night seems greater; where exposed the snow drifts from the fields to the fences; streams rise quicker after storms and go dry sooner than when more forest existed. 5. Better education of farmers to the value of forests in nature. Instruction in rural schools and a more general observing of arbor day.—H. S. Moore, Hamilton.

2. Three years ago I planted out seed including catalpa, butternut, black walnut, and American sweet chestnut—I since put in maple and yellow locust. The whole grew amazingly, and when a year old, I transplanted them and now have trees from six to nine feet high. My experience would lead me to recommend my brother farmers to start forest plantations at once. I might add that

I consider your forestry report a grand publication. My knowledge of tree-planting has been largely acquired by reading the reports.—CHRYSTAL GOSSEL, Kincardine, Bruce.

1. A small per cent. of the farmers have been setting maples for ornament. 3. There is but one bush in my neighborhood where cattle are excluded that I know of, and that is my own. 5. I would advise all persons having woodland to keep stock from running in to them, Lastly, would advise all persons to set out plantations and also trees for ornament.—WILLIAM NEICE, Stromness, Monck.

1. I am strongly in favor of tree planting. Since this section of country has been denuded of timber our winter roads are nearly impassable ; the winds sweep the fields bare of snow and pile it up on the roads. We often have to drive in the fields which makes travelling very disagreeable. Our meadows are often badly winter-killed for want of a covering of snow. My neighbor, on the east side of my farm, has a nice sugar bush of twenty-five acres, which affords considerable shelter to my fields opposite. 2. Our first snow storm last winter came on the 27th and 28th November, from the east with a very strong wind which swept the fields bare where there was no shelter, but opposite the bush mentioned the fields were covered with snow, to the great benefit of the clover in my new meadow. Where the snow lay there was a fine crop of clover and timothy this season. The rest of the meadow was winter-killed, no clover remaining and timothy injured. Concerning orchards, I find that shelter is very beneficial. Thirty-five years ago I planted my first apple trees. The winter after was very severe. My trees all died except a few that were planted near the fences and were covered in the snow drifts ; these trees still remain vigorous, while I have had to renew the middle of the field with apple trees several times since. We have done considerable tree planting the last thirty years, which has improved the appearance of my farm very much and makes considerable shelter. We have a row of sugar maples on each side of the highway, across my farm, also other trees planted around orchards and gardens. We find that evergreen trees make a good windbreak. On the north side of orchards and farm yards we need shelter very much in this cold climate. We find that where fields are sheltered by woods the frost does not penetrate so deep in winter, therefore the soil dries much earlier in spring and is ready for cultivation much sooner than fields that are not sheltered.—WILLIAM CROSS, Caledonia Springs, Prescott Co.

1. A large number of trees are planted for ornament, few for windbreaks. 2. But one plantation in this section—that is sugar maple, and is doing well. 3. No, very few but they should be. 4. Yes, I fancy we have more sudden changes than formerly, also longer and more severe droughts, it also affects our streams very much—sudden floods and very low water. The wind certainly has far more sweep than formerly to drift snow. 5. I think evergreen trees should be planted along the roadsides. Something must be done, and done soon, to keep up our supply of timber. There is a great deal of waste land that is now almost worthless that could be made very profitable by planting to trees.—R. DAWSON, Mohawk, Brant Co.

1. A few of the better farms have single rows of trees along the roads and fences. 5. More and better planting and better care when planted.—A. H. GOING, Tilsonburg, Norfolk Co.

As I am an ardent supporter of tree planting and forestry, I beg leave to reply I am constantly travelling through the County of Norfolk. The original forests are fast disappearing, and no effort has been made to replace them. There was a splendid forest all through here of pine, oak, elm, chestnut, walnut, beech, maple, etc., but it is largely gone now. All kinds of trees grow well here, and if the farmers could only be got to take an interest, even if the mere seed were sown and cattle kept out, the woods would soon be crowded with fine young trees.—J. S. HODGINS, Simcoe, Norfolk Co.

Within the past ten years I have set out some four or five hundred trees, principally maples, with a few Lombardy poplars, horsechestnuts and Russian mulberries. My opinion is that tree planting should be encouraged by every means possible, as they are not only ornamental and beautiful shades, but serve chiefly as a great check upon the bleak and drying winds that sweep across the country deterring and often destroying rapid and healthy vegetation. The total deforesting of a country exposes it to the action of wind and heat, encouraging droughts and the drying up of springs and streams that give moisture to the immediate vicinity surrounding them.—WILSON ARNOLD, Trenton, Hastings Co.

Tree planting would be of great benefit to orchards and fields, as the country in this part is so cleared up that even the fall wheat suffers to a great extent from having no shelter. I would recommend a double row of trees along the dividing lines of every farm, and also on the sides of orchards.—ROBERT GIRVIN Thornyhurst, Bothwell,

Since the forest has been cleared between me and the lake and the country is exposed to the full sweep of the wind from the lake ; the snow drifts in great piles around fences and sweeps the fields bare, making it almost impossible to raise any fall wheat, except around the fences where the snow lies. I honestly believe if forest trees were planted in abundance it would remedy this, and we would be able to grow larger crops of fall wheat, and be able to drive along the roads in winter.—THOMAS SALLOWS, Goderich, Huron Co.

In Georgina, Thorah and Brock many farmers have planted out lines of trees. Maples prosper ; of 250 I saw set out only four died. The higher ground is exposed. I have often seen fall wheat come through winter in good shape but the cold winds of March and April would kill it. I know only of one man who preserved a real wind break—a second growth of maples which he had fenced off—some forty feet. This gentleman, Mr. Keenan, now of Orillia, told me that he never had one crop to fail him during some thirty years. Cattle are permitted to roam everywhere in the forest. The drifting of snow is much greater than formerly. Creeks and wells dry up in summer that did not do so before. As to the remedy, that seems difficult. The people do not understand the matter and it must be impressed upon their minds ; first upon the old, then upon the young. To reach the old a prize might be given by the county or township for the best artificially protected farm. The young should be imbued with ideas of forestry in the schools.—FRANCIS F. ROHLEDER, Vroomanton, Ontario Co.

Much valuable timber destroyed in our township, but none that could be helped for several years back. Wood will scarce last fifteen years ; many have none. 1. Not one in a hundred have a good wind-break, but handsome rows of maples are growing up. 2. No plantations. 3. Cattle not fenced out. 4. Snowdrifts bad. 5. After a few years when wood becomes more valuable the farmers will see it to be to their interest to keep cattle out of their woods, and will put out plantations of young trees on rough pieces of ground. Wood has been of no value in the past, and men have been doing all they could to get rid of it ; so that you and all the men in Canada may write and talk to no purpose until wood gets scarce and more valuable, then there will be a rush all at once on how to secure a supply of wood. I am of opinion that when men see those beautiful rows of maples grow up in front of farms, and how it beautifies and makes the farm more valuable, that one after the other will follow suit until all, or nearly all, will have them planted out.—ANDREW MCGILL, Chatsworth, Grey Co.

Notice a cleared valley; in the spring the side hills will often be bare of grass or wheat, or whatever might have been there. The current of air has been too strong. Plant trees across alternately so as to turn the current and the air will be checked, and those side hills bear the best fruit. Plant chestnut, both for posts and rails, for the nuts and for honey. Basswood is excellent, too, for bees and for lumber. The elm, too, is good here. But also plant cedar and spruce, for these trees drive away insects, especially from orchards, banishing the curculio from plums and cherries. Alternately, too, in an orchard these resinous trees are good for the same purpose. People should plant more of these trees and less of maple, for there is no tree grows which reduces the soil as much as maple.—L. Kitchen, Bloomsburg, Norfolk Co.

1. Very few lines of trees are being planted, also very few of the ornamental. 2. Very few have been (young trees) set out, and what have been are maple. But they do not thrive, as the way people have of planting is not of the best. 3. Cattle are not fenced out from the forest. But they should, and most farmers know that. 4. I do not know of any difference in climate or rainfall, but I do in snow drifts. More dust now, less health, more catarrh, more wind, more dryness more discontent. I would make this recommendation to every farmer. Near his house I would have a square on the north side filled up with all sorts of trees, such as butternut, hickory, walnut, beechnut, hazel, cherry—all wild kinds. Then, again, between the forest trees and house I should have a few flowering trees and shrubs. The whole thing would improve the farm and add beauty to the scene.—M. W. Sumner, Carleton Place, Lanark Co.

Until the last few years very little tree planting has been done. But now farmers are awakening to see the necessity of planting belts of trees for shelter, to protect their orchards and buildings from the fierce storms which, as the natural forest is being cut down, sweep more frequently through the country; and already a good beginning has been made in planting shelter belts, chiefly of Norway spruce, and the general feeling is to continue until their orchards and buildings are completely sheltered. Some fourteen years ago, while my neighbours were more or less protected by standing bush, my farm being very much exposed, especially on the north-west side, where for miles the storms had a clear sweep, I planted a double row of evergreens, principally Norway spruce, seventy rods in length on the north and west sides of my orchard and buildings. As I took care to transplant them properly they made a rapid growth, and now, instead of having the coldest place in the neighbourhood, I have the most comfortable, at least so far as storms are concerned. Some of my neighbours who, when I commenced planting, said I was doing a foolish thing, now wish that they had as good a shelter belt as I have. The benefit of shelter to the orchard I find to be very great. Some kinds of fruit and ornamental trees which winter killed while unprotected, now, by being sheltered, come through the winter very well. For instance, I had a number of some fine varieties of plums which winter killed before being protected, but are now doing very well. But the greatest benefits of shelter to orchards, at least in this section of the country, I find to be the protecting the fruit from being blown down by the high winds of late autumn, which generally blows down the largest and best fruit, which is thereby nearly rendered useless. The benefit and comfort of shelter to persons and cattle are very great, in fact it is "better felt than told."—John M. McAinsh, Belton, Middlesex Co.

1. Many plant trees along the road, and some for wind-breaks round orchards. 2. Not many timber plantations, but very many forest trees. 3. In some woods cattle are kept out, and there the second growth does well. 4. Lines in winter filled with snow. 5. Exemption from taxes for forest preservation.—Charles Ellis, Meaford, Grey.

1. Only along roadsides are trees planted, and that principally for ornament, a great many have been planted in that way, and a few evergreens around buildings. 2. No plantations set out. 3. One or two of the neighbours have excluded cattle, and a nice undergrowth has come up. 4. Since the clearing up of the country I notice the weather is more changeable, the snow drifts more, and we are very much more troubled with floods in time of freshets. 5. I do not think anything can be done to remedy the present state of affairs except something on a very large scale, such as planting with trees the hillsides, especially along rivers and creeks. I would like to see something done to prevent matters from getting worse.—ALEX. FLETCHER, Mount Albert, York.

On lot 5, rear 4th Whitchurch, the owner, Mr. Lloyd, assured me he could always count on fall wheat in certain fields, due to a good sized forest on the north side of the road. I noticed four or five fields of extra good fall wheat last spring west of here, near Richmond Hill station. They were admired by everybody, and the cause was a beautiful strip of pines running north from the side-road on ridge. 5. If ridges like the above could be replanted with evergreens it would effect quite a revolution in the wheat growing of the district, and also in the clover crop.—S. J. WILSON, M.D., Richmond Hill, York.

We think so much of tree planting for shelter, etc., that we have surrounded our farm lands with evergreens and hedge fences, and are planting the same around farm yards and buildings and across the farm for orchard protection. Twenty-five years ago the bleak winds of Lake Erie were held back by our forest, now they sweep across with violence, making its effects felt on man, beast, fences and crops, while all our natural timber forest is gone on our improved lands. We have preserved groves of maple, near which our crops are safe.—E. & S. G. WIGLE, Ruthven, Essex Co.

1. Trees have been planted for ornament quite largely along highways and approaches to residences. Wind-breaks not to any great extent, and are mostly cedar, soft maple, etc. 2. Not enough done to express an intelligent view, but think they would prove a good investment, especially on waste upland. 3. The cattle are allowed in nearly all the woods in this locality, but where fenced out a few years make a vast improvement. Since the woods have been cleared up the snow is in stacks when there is any to drift. In regard to rain, it is at times sent in abundance, while the next season it is a hot, dry time from seed time till harvest. 5. I think if farmers could be induced to plant waste lands to forest and shelter belts we could help the existing state of affairs. There is not a score of farms in this Township but has from two to ten acres unfit to cultivate.—A. S. HODGINS, Osnabruck Centre, Stormont Co.

With the exception of a few trees being planted along the front of their farms by some of our more tasteful farmers, there is nothing done to increase the acreage of timber land. The original forest is fast disappearing, especially in heavy clay soils where the roots do not penetrate deeply and the high winds blow down great quantities annually. I have preserved some fine groves of young timber when clearing, which I value very highly for shade and beauty. I find the hard maple the best tree we have for the purpose of shade and ornament.—H. M. VALENS, Lucknow, Bruce Co.

1. There are few wind-breaks being planted here, but a good many spruce are being planted about the farmers' houses, and deciduous trees on the borders of the roads and in the village streets, all doing well. 2. No, land here is too valuable. 3. No forest here to speak of. Cattle allowed to run. 4. Yes, the creeks and small rivers fill and empty themselves quicker after thaw or rain. 5. Farmers should be induced to plant trees along the fences. The town council

might furnish the trees (deciduous—the conifer are too shady in the spring) if the farmers would plant, and keep them in order.—Charles E. Torrance, Burlington, Halton Co.

Very little is being done here in the interest of forestry. The forests are fast disappearing, and indeed there is not much use in trying to save the heavy timber, for the high winds of late years blow it down. There are some lines of trees being planted for ornament, none for wind-break to my knowledge. No plantations of forest trees except those planted in rows along fences or on the roadside. I do not know of any bush where cattle are fenced out to save the young trees. Of course there are some sugar bushes nicely kept. Since the country has been cleared, the winds are very much higher, drifting the snow, blocking the roads, breaking down fences and even buildings at times. If the children in the country schools were taught the principles of forestry, it would through them reach the right persons, and would I think, do good. If some of our politicians would tell the farmers about the influence of the forest upon the climate, and talk less about politics, they would then be doing some good for the country.—J. Newman, Cardinal, Grenville Co.

1. Lines for wind-breaks not planted to any extent, but for shade and ornament quite freely, the maple especially. Where cattle are kept away, they thrive well. Have planted myself a large number of Norway spruce, Scotch fir and larch. The firs have done well, the larch not so well. 2. I do not know of any plantations having been set out in this neighborhood. 3. Generally speaking, cattle have not been fenced out of the bush, the consequences being that our woods are rapidly disappearing, and in a few years we will have no bush to fence. The trees are dying faster than we can use them, and in many cases the little piece of bush left is being cut down to save its value in dollars and cents. 4. There is a great difference in the way the rainfall finds its way off the surface. Creeks that once run all the year round, are now dry except for a week or two after heavy rains, when they fill up suddenly, causing floods that are very destructive. 5. Some little thing, however, each one of us might do, we could plant a few hundred evergreens round our houses and barns, which besides adorning our homes and making the landscape a "thing of beauty and joy forever," would naturally add to our comfort, and our children after us would rise up and call us blessed.—James Williamson, Jarvis, Haldimand Co.

The following letters are from various nursery-men and tree-growers, who were asked to give their opinion on the value of tree shelter:—

As regards tree planting as wind-breaks for orchards, I find that those who have wind-breaks are of the opinion that there is a decided benefit derived therefrom, in preventing the fruit from blowing off, also a protection from the cold in winter. I have noticed fruit trees have a healthier appearance where they are protected by an evergreen belt, than those that are exposed. I am convinced the Norway spruce, ash and Scotch pines, are the best trees for wind-breaks, they grow rapidly, are hardy, live long, bear transplanting well. I would advise planters to plant two or three foot trees twice transplanted, as they will have more success with that size than smaller.—M. Milgan, Bright, Oxford Co.

I will give you one fact which is worth a host of arguments:

The apple crop is almost a total failure here, but there is one orchard of one hundred and sixty trees, owned by B. Johnston, Esq., of Carleton. The tenant, James Kingdom, has refused $450 for the year's crop as it hung on the trees. This orchard adjoins the village of Islington, and I can vouch for the facts.

I think it is a mistake to plant shade trees on country roads where the soil is clay, as it prevents the roads from drying, but on sand or along inside fences they would do much good. There is a grove of young pines on the north of

Mr. Johnston's orchard, it covers about half an acre, and protects the trees from the north winds. That is the only reason I can find why this is the only orchard with a crop of fruit on it, in this locality.—J. D. EVANS, Islington, York Co.

There have been many trees planted in this district, many more than have been cared for. Some have the idea, after a tree is planted that is all that is needed, and should make a fine tree without further care, hence so many failures. —A. G. HULL, St. Catharines, Lincoln Co,

The devastation of our forests have rendered it necessary to import European trees, of which I believe the Norway spruce to be the best for shelter, being evergreen. Orchards unsheltered have their fruit blown from the trees untimely, and in time the trees become unfruitful and their growth stunted. I firmly believe the cause of many failures is the planting of trees that are too old. I have planted successfully maple, poplar and spruce.—WM. VAIR, Barrie, Simcoe County.

I think the greatest example of the benefits of protection from heavy winds that I know of, is the notorious fact that along the base of the Niagara escarpment, frost is almost invariably three weeks at least later in doing damage to fruit in the autumn than it is one hundred rods even from the base. It cannot be said therefore that frost is kept off entirely by the wind off the lake, though of course in the winter and spring it is chiefly the proximity of Lake Ontario on the north that makes fruit growing here so successful. In a lesser degree therefore I should say wind-breaks would prevent in a measure the early autumn frosts, provided they are not on the side nearest the water, which is the greatest safeguard at all seasons. It is little use urging the planting of forest trees upon the majority of men until it can be shown to be directly profitable in their own generation, though there may be here and their a man public spirited and farseeing enough to plant them. In this township of Saltfleet, though a bonus of twenty cents per tree is paid for each tree planted on the roadside, and no cattle or stock of any kind is allowed to run at large unherded, still very few comparatively have planted. I have long urged the importance of the subject. The benefits of wind-breaks on the south and west side of every ten acre field to the crop of winter wheat or clover in causing the snow to lie evenly over the field would soon repay the loss of tillable land. One row of trees would in a few years answer instead of posts, to which wires could be attached for a fence. A row of hard maples would pay well in the crop of delicious syrup and maple sugar which they would produce in twenty years from planting, chestnuts on suitable soil will pay as well as any fruit, and moreover one row might be a row of apple trees. It can easily be demonstrated that a direct source of revenue could be derived from such strips, which I would plant four rods in width, irrespective of the indirect gains previously mentioned.

Every farmer knows that on the lee side of every fence immense snow drifts slowly melting in the spring, often keeps him a week or perhaps two weeks off the land, when the remainder of the field is dry, involving often a crop five or ten bushels per acre less than if sowed earlier. With heavy wind-breaks, the snow would lie evenly over the land and disappear evenly.

It may be urged that tall trees would keep the land shaded and wet on the north side. This could be obviated by planting the very tall growing trees on south side of the belt, gradually decreasing the height, so that the row nearest the north of the belt would be say a row of apple trees, that if it shaded the ground for a short distance would return a profit for a narrow strip left unsown to be cultivated later, as all orchard trees should be, and continuously through the season. A farm surrounded and adorned by rows of evergreens, is a charming sight; some may be seen in Burford township. I am sure such farms would sell to a man of taste for ten dollars per acre more than one unadorned, though the owner of such a farm seldom needs or wishes to sell.—E. D. Smith, Winona, Wentworth Co.

I have noticed with the gradual destruction of the forests year by year, a corresponding increase of drouths, and while we may even now have as great a rainfall from year to year as in the days when our forests were in their prime, yet the exposure of such a large proportion of the country's surface to the direct rays of the sun, accompanied by an unobstructed motion of the air, soon absorbs the moisture given by any rain, and in such case of rapid evaporation, the soil becomes hardened and cracks open, making the matter all the worse. Anyone engaged in using or running dry kilns of any kind, whether in making brick, drying lumber or evaporating fruits, will soon learn the necessity of a high temperature with the application of a rapid draft of dry air, in order to rapidly extract the water, and carry off the same. Sturtevant gives the following table as correct, and I have found in my experience in evaporating apples, that he is right in his theory, but the amount of water given is too high. Assuming that 1 cubic foot of air at 32° Fah. or freezing point, will carry $\frac{1}{4}$ of an ounce of water, he claims that with a rise of 27° or at 59° Fah. 1 cubic foot will carry double that or $\frac{1}{2}$ oz., and with every 27° additional in the rise of temperature, the atmosphere will absorb and carry off double the amount of water, therefore with a temperature of 194, being about the average temperature at which evaporators are usually run, each cubic foot will carry 16 ounces of water. Then if the draft of air is by any means increased, the absorption is increased in proportion. Now I have noticed that this is precisely the state of things in reference to the present action of the sun's heat and the unobstructed breezes and high winds, upon the surface of our country as it is now denuded of its forests. The hotter the weather, and the greater the velocity of the wind at the same time, the more rapid will be the absorption of moisture from the soil, and the more severe will be our drouths, and the more destructive will be our rains, accompanied by more frequent winds and cyclones. I believe the most practical outlay in the way of tree-planting, would be in planting wind-breaks of evergreens, and allowing them to grow as tall as possible, thus diminishing the absorbing action of the wind by decreasing its speed, and at the same time beautifying the country and making it more comfortable in winter as well as summer.—Joseph Tweddle, Stony Creek, Wentworth Co.

Norway spruce and Austrian pine are about the best kind of trees for windbreaks. We know of some very fine Norway spruce windbreaks around nursery grounds in New York State. The trees are planted close together, almost like in hedge row, and stand now from thirty to forty feet high, making a complete shelter from all heavy winds.—Smith & Van Duser, Winona, Wentworth Co.

It is now very evident that good timber of any kind will soon be very scarce and dear, and unless something is done to prevent deforestry of the country, we will soon be under the expensive necessity of importing lumber. For re-foresting burnt off areas, I believe there is no tree so well adapted as the white pine. The European larch, Scotch pine, and Austrian pine, grow quickly into useful timber, but in that respect they are not at all equal to the white pine. If I were to plant out a forest with a view of obtaining remunerative returns, I would plant it all of white pine. I would plant thickly and thin out as they grew large. For shelter belts I should prefer the Norway spruce, white spruce and Austrian pine.—D. Nicol, Kingston.

In the vicinity of Drummondville, Ont., there have been a great many trees (principally Norway spruce) planted as a protection to orchards and small fruits with much benefit. But would not recommend either too close or too wide a belt of spruce around an orchard, or *too close to* the orchard, as the breaking off of all the wind tends to increase the codling moth. I would recommend the European larch as the best and most rapid grower of any.—E. MORRIS, Fonthill, Welland.

I would say, if the ground is stiff clay, for young trees I take some coarse sand, and work the sand and soil together and work it around the young roots of the tree; and if you plant one tree with sand and another without sand, you will see that the tree planted with sand will outgrow the other in two years. You will find the same with all kinds of trees and shrubs.—W. M. MORRIS, Seaforth, Huron Co.

We might mention our experience with a small peach orchard. During the past ten years we have had about one hundred trees planted where they are sheltered from the north and west winds by a belt of oak and birch timber. This orchard has repeatedly borne a good crop during seasons when others in the immediate vicinity, but without a shelter, had no fruit whatever.—WEBSTER BROS., Hamilton.

GENERAL CONDITION OF THE NORTH AMERICAN FORESTS.

Translated from the German by H. Von Lorenz

Dr. Mayr, from whose late publication, "The Forests of North America," this article is taken, writes it as an official report for the benefit of Germany. It was written in Japan, where he is now professor of sylviculture, at Tokio. It is very interesting to Canadians, as the view of an educated foreigner. He visited America twice for the purpose:—

When the first Europeans landed on the new continent, they found before them one immense forest.

A vast virgin forest extended at that time from the south point of Florida to the coast of Labrador, through thirty-five degrees of latitude, and from the coast of the Atlantic Ocean to the border of the prairie, that means fully twenty degrees of longitude. If you count the average length of this forest at twenty-five degrees of latitude and the average breadth at twenty degrees of longitude, the forest originally covered the tenfold area of the German Empire; how much of this exists at the present time is hard even to guess.

The non-observant person who travels through North America generally has the impression that the forests are in their original state, that with the exception of a few States forests so prevail that farms only form a small factor of the whole; but the expert would realize immediately that hardly one-third of those woods which his ancestors found 400 years ago now deserves the name of "forest." Two thirds are of later growth, or composed of the remnants of their kind, left only on account of their lack of value. The original virgin forests flourished everywhere, in the mountains as well as in the plains. No rock in the Alleghany Mountains was too steep to prevent single trees from growing in amongst the boulders; the soil of none of the plains was too poor or unproductive, but that large forests would grow in the course of centuries. The swamps alone were the only portions of the country not covered with trees. This fact deserves to be recorded for the information of future generations: for already, in many portions of the country, the forests have been so annihilated that one would scarcely believe that those parts were once covered by magnificent woods.

(The reader will observe that at this point Dr. Mayr indulges in prophesy and takes up the idea which has before been stated on this side the Atlantic, that a large part of the west by planting will ultimately become forested, while the east and southern sea coast, once forested, will fail to preserve any sufficient amount.)

The person travelling through the states surrounding the Gulf of Mexico in fifty years from to-day would not believe that those deserts, covered for miles and miles with snow-white sand, once bore the most magnificent pine trees of the world. In fifty years no man will think it possible that those many bare and sandy rocky slopes of the Alleghanies once were covered with the finest oak, maple, elm and other trees.

In fifty years it will sound almost fabulous that those far-stretching swamps of the southern Wisconsin and Michigan were at one time covered with timbers of the finest varieties and skirted by the finest white pines instead of the poor shrubbery of that day.

Now, let us go farther west and skip again fifty years. What splendid woods will flourish there, owing their existence to the hands of men, on plains once considered deserts incapable of producing anything. People will have planted those woods realizing their great advantages and benefits. Look then at the prosperity of these western settlers who will have propagated new forests in contrast with many of those in the east, who, by fire and axe, transformed their beautiful forests into desolate places and even deserts. The great mistake of the western settlers is likely to consist in mixing too many inferior kinds with the better grades, with the view of producing timber of more use for purposes of fuel than of manufacture. The European woods planted by them will probably not realize their anticipation.

Let us go even farther west. In fifty years it will be almost impossible to comprehend that the beautiful and fertile California, the fruit garden of the Union, once was largely inferior prairie; we could even doubt to be in America, for forests of Australian eucalyptus and acacias grow everywhere; the once hot and barren prairie is transformed in a subtropical garden with all the advantages of this splendid climate.

The doctor then reviews the present:—

Immense sums have been spent in the construction of dams to prevent the streams from the mountains from overflowing the lands during the heavy rains.

Large amounts have also been expended in artificial irrigation after the natural supply of water has ceased from the destruction of the forests in the mountainous districts; the latter has been the case all through the United States. There are some more facts which the observant traveller in America can find every day.

A mountain devoid of trees having on the slopes among the big boulders portions of soil covered with grass and lying on the surface of the rocks, stumps and roots of trees interwoven like a spider's web. What vast quantities of the finest soil are washed down by the rain, owing to the senseless destruction of the forests. One year has destroyed more than centuries can replace. The rain previously partly absorbed by the forests descending in small streams, now rushes down in torrents more annihilating and destroying than fertilizing. Many of the beautiful mountains and valleys of the Alleghanies, Adirondacks, and even the western mountains, will soon be in the same condition. A good many prominent men have already tried to warn and even to interfere, but people declared them dreamers and boasted of the everlasting riches of their forests.

The loudest noise, of course, was made by those who had the largest interest in keeping the nation in blindness concerning the condition of the forests and of their future.

The nation even does not know its own absolute property, many Government and States-lands you find officially described as covered with dense forests; but the truth is, since a long time the best of it is stolen, burnt and the rest left to decay. And to make it worse, fire destroys every year large portions of the younger growth.

The state of New York, to give an instance, according to the report of the forestry commission, Albany, 1885, possesses, or rather claims to possess in the Adirondack 312,400 ha. (the hectare is two and one-half acres) genuine forest. The commission sent out to investigate the condition of these mountain forests could not even fix the boundaries of the State's property, so much of it was claimed by private owners.

In a few districts the State owns widely extended woods, but mostly they are small parcels, hardly ever exceeding 100 ha. Nothing is done by the State of New York to protect and save its forests. (Efforts, however, are being made to save portions of the Adirondacks.) It even does not know their boundaries. Numerous settlers make a fair living by robbing the States forests, and help, by fire and axe, the government to *improve* the woodlands, that is to annihilate forest and forest soil.

Of course, the prospects of the national property are exceedingly dull since the nation does not take care of itself; people often regard and talk about States property as if it had no owner at all, while every citizen is fully entitled to his legal share of it.

You will find in the Union, that when you leave the capital and go west, the ideas about right often decrease in the same way as your distance from said point is increasing.

According to the annual record of the year 1883, the Union Government some times had allowed the poorest settlers and miners in Colorado to take the timber for their domestic use from the government forests. If the law was a liberal one, the interpretation of the settlers was even more so. Government officials, arriving there a few years afterwards, found in the bed of one of the mountain streams half a million of ties, nominally appropriated for domestic use, but really intended for building a railroad.

In Fernow's records I read that the government expends for the protection of the forests annually millions of marks; but what do they amount to if they disappear somewhere without giving the forests the least benefit.

To do credit to the present government we must add, that it has tried to awake public interest concerning government lands and even recovered for the nation 40,000,000 ha. of land illegally held by private individuals and corporations.

In the mountains and in lands where the soil is too poor for continual agricultural purposes, on borders of rivers as long as there is no artificial irrigation, the preservation of the forest is a natural necessity for the protection of the lower lands.

It is not my opinion that the government ought to keep for its own property timber-lands suitable for farming purposes; but it ought to consecrate all its means and powers where the common interest and future is at stake.

In consequence of the immense riches and the great industry of the enterprising people, the government always has a large surplus in the treasury. My opinion is (it may sound ridiculous to the American), the best way to refund part of this money to the nation would be by buying from private individuals those mountain forests now held by them, and destined to an early annihilation, and to protect them by simple measures, perhaps after the system used in India, against fires, to control them by a government official, and a certain number of constables against thieves, hunters and tourists. The government, and only the government, can afford the monetary loss of interest, but it will be paid ten-fold after the lapse of a few decades.

The consequences of the annihilation of the forests in the mountains are generally known. The best instances may be found in the old world. The illusion that in America everything is different is nonsense. The laws of nature are the same everywhere; the soil may be better here, the climate more favorable for the growth of timber; but the results will be the same; they can be delayed, never changed.

If this mismanagement continues the way it is going on now, it would not take the eye of a prophet to foresee the final condition of many now beautiful and flourishing portions of the country. They will soon, in regard to their barrenness and desolate aspect, rival the southern districts of the Tyrol, South France and Spain.

The government possesses numerous forests in the mountain regions, but it tries to get rid of them as soon as possible and often at miserable prices. The loss of those forests is identical with its ruin. You may say the State helps, while it would be its duty and policy to prevent the shameless destruction of the country, which enriches a few individuals at the cost of the multitude.

Personal liberty and free use of property are the fundamental ideas of the constitution of the union—laws too ideal for a good many of its representatives; to respect the personal freedom of a single individual without conscience, means to trample under foot the personal liberty of thousands better than him.

This ought to justify the claim of the nation that the forests in the mountains, never mind who owns them, must be preserved. To allow hundreds the full free use of their rights and properties, the individual must be restrained. It is more than comical to hear the American talk about the European governments, whose despotism even does not respect private property.

The law in Europe for the protection of forests on mountains, extremely poor lands or borders of rivers is only made for people without knowledge or conscience; nearly all the owners of mountain forests do not need the law; they know too well themselves that the preservation of the woods is identical with the increase of the value of their property.

When the constitution fails to force the individual to preserve the forests, the government ought to have the power to expropriate it for itself for a fair sum and take the management of the forests into its own hands. What part of said forests is sold or given away at the present time, will in a hundred years from to-day be bought by the government for immense sums; for the private person never gives things away as the government has done. And the incredible amount which the French government spends every year for improving foolishly destroyed forests, go to prove what a hard and expensive task it is.

As already mentioned it is a positive necessity to preserve the forest at places where the soil is mere sand or inclined to become swampy. This is the case in many parts of the country, especially in the south and south-east, where around the Gulf of Mexico and along the Atlantic Ocean we find thousands of square miles of this kind of soil. Large forests of the finest pines are destroyed every year and the new growth is often annihilated by fire. Already we can see the dry white sand looking through the thin grass. With the last tree and its shade even the latter will disappear. The heavy fertilizing rains even in those countries cannot alter this state of things. Nothing is done by the government to prevent this. Maybe there exist laws concerning the preservation of the forest ; but laws not enforced and laughed at by everybody are worse than no laws at all.

Wisconsin, Michigan and Minnesota are rich in valuable forests of pine and maple ; many hundred square miles of swamps are covered with white cedar (*Thuja occidentalis*), spruce and balsam. These trees owe their existence to the heavy sphagnum moss that grows there ; it offers room enough for the roots and separates them from the stagnant waters.

Different kinds of shrubberies grow on it in great variety. Fell those trees and soon the moss will disappear ; the sunlight and the increasing warmth combined with the dryer air will soon replace it by flowers of another class. The soil is getting worse every day and soon will be almost unfit for cultivation. Already many citizens can tell about swamps, which at the present time nobody is able to pass, but which they remember being covered with dense forest.

The traveller from Europe is always surprised by the exceedingly long wooden railroad bridges over comparatively small rivers. In America almost all the rivers have their own free movement, their beds are one year here, the next year there. From their looks it is easy to judge the condition of the higher lands, where they come from.

Rivers, which always carry dirty water and, during the heavy rains, are swollen to considerable extent and take everywhere parts of lands away, come from a country where there is no forest at all or where by negligence the woods are almost annihilated. Such rivers we find in Ceylon, where the English, in order to extend their coffee, tea, and cinchona plantations, commenced with the destruction of the forests in the mountains ; the same we see in Japan, Spain and North Italy. After every heavy rain people live in constant fear of inundations. The American rivers are partly in this state. It is an infallible proof that a change must have taken place, if a stream, whose sides are lined by trees hundreds of years old, commences during every long rain to undermine its banks and finally washes them with the trees away.

Instances like this speak better than any book written concerning this subject. The destruction of the forests in the Adirondacks by fire, and the fruitless trials to use these mountains for agricultural purposes, caused quite a change in the depth of the Hudson River, which even during the dry times received a considerable supply of water from the dense forests of the mountains. Peekskill used to be a water station of the N. Y. Central and Hudson R. R. R., but had to be abandoned, because during the dry season the salt water of the ocean came up as far as Tivoli ; and salt water cannot be used for the filling of the locomotive boilers.

Many look indifferently at the devastation of the forests, believing themselves to be able to replace its beneficial effects by a great scheme. Their idea is to build enormous reservoirs, which could be filled during the rains with water and the contents of which could be used for the irrigation of the cultivated lands. But the filling of such a reservoir would need an immense area and we will hope the rains might never be too heavy, for the collapse of such a reservoir might be more fatal than a waterspout.

It seems better to me instead of investing immense sums in erection and keeping of those reservoirs, to use the money for buying up and preserving the mountain forests, where it would show that these natural reservoirs pay well, while the artificial ones only would absorb large sums every year. In spite of the terrible destruction of the forests in America, I believe at the present time it would take only very little help to bring a sufficient quantity of them back to their old condition, if it were only possible to keep the fire away from it.

Danger of fire in forests in the cultivated countries of Europe has become very rare; in case of it everybody would hasten to extinguish it as soon as possible. [Listen Americans! The government has there even a right to compel its citizens to help]. In India, owing to the energetic measures of the government and to its steady watchfulness, the number of forest fires is rapidly decreasing annually, while the younger growth is prospering. In the smaller country, in Japan, fires hardly ever occur, and the intelligent industrious people are busily engaged in building up their destroyed forests. In North America forest fires occur every day, and people generally look at them with indifference; what else could you expect from the descendants of a nation which has no forests, and so of course does not know how to appreciate their benefits.

It is not a very nice but an instructive chapter to study the causes of these fires; we can see what people are able to do in the country of the greatest personal liberty, whose laws for protection of forests, if they exist, are only humbug.

From the records of Prof. Sargent we see that in the single year 1879–1880, 480,960 ha. of forests, valued at about 100 million marks [$25,000,000], were annihilated by fire. Incendiarism was mostly caused by timber thieves, who set the forest on fire to efface the traces of their thefts.

Regarding the Yellowstone Park, the wonderland and declared national property of the Union, Winser, in his "Guide for Travellers" says: It is greatly to be deplored, that by the carelessness of camping visitors (mostly educated men) large parts of the finest forests were burned down. This fire broke out because the simplest care concerning camp-fires was neglected; therefore travellers in the park are now compelled to ride through miles of black stumps instead of under the refreshing shades of gigantic trees. People of refinement and means, as they seem to have been, ought to have been held responsible by law for the damages done by their carelessness; the amount could easily be fixed according to the value of the lost timber. The loss of the newer growth could not be ascertained, and besides, the forests suffer because capitalists will not invest their money as long as there is no government protection to secure them.

THE FOREST AS A NATIONAL RESOURCE.*

By Prof. Fernow, Washington.

In a paper which I read before this section last year, I classified the natural resources which serve the material progress of nations with reference to the position which the nation as a whole, the government, ought to take towards them. I endeavored to show more specially, that the most prominent functions of government in regard to these resources are or ought to be providential in their nature; that the State, in its very conception being an institution for the purpose of insuring not only our present but future and continued welfare of the community, must have an interest in the permanence and proper utilization of natural resources, upon which this welfare rests.

To restate briefly the classification, we found two principal classes, namely:

(*a*) Resources which yield directly the necessaries or conveniences of life and form objects of industrial activity;

(*b*) Resources which serve indirectly the comforts of society, industry and progress of civilization, and do not form objects of industrial activity.

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* Read at the meeting of the American Forestry Association, Quebec, 1890.

It is the former class of resources mainly, which, if left to individual control, are most apt to deteriorate and in regard to which the interests of the individual and the community are most frequently at variance, and it is most difficult to find the proper balance between permissible freedom or individual disposal and necessary restriction by communal interest.

In regard to the second class of resources, such as air, light, waterways, etc., the providential function of the State is much better understood and conceded, although even here the *laissez-faire* idiosynscrasists would give to individualism the widest latitude.

The resources which form objects on industrial activity were again divided, with reference to their continuity, into

1. Resources exhaustible and not restorable;
2. Resources restorable, but liable to deterioration under increased activity;
3. Resources restorable and apt to yield increased returns to increased activity.

To intelligently define the position which the State should take in the matter of protecting its resources against too rapid exhaustion or unnecessary deterioration, we must keep always in view the implied interest of the State in the future, and understand the nature of the resource, with reference to its future.

In this paper it is proposed to define the proper position of the State towards its forest resources, and for this purpose to investigate the nature of these resources.

It is questionable whether the forest itself may be considered a resource. It is in reality a crop, a product of the soil; and the soil with its fertility is the resource proper, which can be turned to this use or to any other.

The forest primeval is nothing but a function of the fertility of the soil. As soon as the soil is not needed for other purposes more useful, this product of the soil may be valuable, and with means of transportation to a distant market, or as far as a home market exists, it may constitute a resource. As soon as with increasing population and hence demand for food-producing areas the occupation of the soil by wood-growth is a hindrance to its agricultural use, and by this antagonism the value of the forest resource is apt to depreciate in proportion to the need for food-areas, the wood product may become the opposite of valuable by necessitating its removal without a market for its disposal; hence the burning log-pile of the pioneer settler, fed by the most valuable timbers. The need for cleared lands tends to diminish the occupation of the soil by wood-growth, until at last an equilibrium results, when the needs for food areas are satisfied and the requirements for wood material make a reservation of soil for forest growth desirable. When at last the stores of the virgin forest are exhausted and it becomes necessary to apply human ingenuity and management to the production of desirable quantities and qualities of wood material on a confined area, a new industry, forestry or forest management, arises, which exercises itself, like agriculture, upon the production of values from the soil.

So long, then, as the virgin forest is not placed under management, its stores represent the resource itself, and, being worked somewhat similarly to the mines, it is an exhaustible resource, differing, however, from such resources as the mines in its capacity of being reproducible. As long as the activity in working the forests is simply directed towards the extraction of the valuable material which nature has stored up for centuries, every increase in this activity means corresponding depreciation and depletion of the resource. As soon as the forest becomes an object of scientific management and artificial forest planting is resorted to, it is the soil and its fertility which is the actual resource, the tree-growth being a product of the same; and then we may range it under the third class of resources, which yield increased returns to an intelligent increased activity, this activity being exercised not in the direction of utilization but of reproduction.

While the virgin forest is worked, as it is in the United States and Canada, simply taking out the material wanted without any regard to its continuance, it represents, as has been stated, almost like a mine, an exhaustible resource; for although reproduction is possible, and in reality occurs, under the regardless methods of utilization not only is the reproduction very partial, but where the better kinds of timber are culled the reproduction can only be of inferior kinds, and the quality of the resource is therefore reduced.

In addition to the irrational method of utilization, which tends to deteriorate the resource, the disastrous fires which overrun the forest areas of the United States annually destroy the accumulated leaf-mould of centuries, thus reducing the fertility, killing the young growth, and, in the end, especially on the hillsides and mountain slopes where, by the baring of the ground the beating rains are allowed to wash off the soil, reforestation is made almost impossible, so that in the end the resource—whether the growth be considered as such or only the soil and its fertility, is exhausted.

But besides furnishing directly wood and incidentally other valuable products, which either as raw material or in manufactured form supply a large number of human wants, the forest at the same time by its functions in the circulation of air and water exercises an influence upon cultural, climatic and sanitary conditions, which classes it to that extent with those resources, which, like air and water itself, are, though indirectly yet most indispensably connected with material and cultural progress, and are of the greatest interest to the nation; so that in considering the position of the State towards forests and forestry, we will have to keep in view these two aspects of the forest—its material value and its cultural function.

The value of any material resource is measured, in the first place, by its comparative abundance. Other factors which enter into the valuation are the demand for it, the ease with which it can be obtained and brought to centers of consumption, the possibility and ease of reproduction; its necessity for our present civilization or more or less easy replacement by other materials may also influence the valuation.

I.—The Forest as a Producer of Material.

As regards the natural reproduction and the consequent abundance of the virgin forest, it may be said that the whole earth is a potential forest. That is to say, with the exception of a comparatively small area—in elevation above timber-line in north and southward distribution beyond eternal frost line, in continental distribution, within rainless deserts and soil-less rocks—tree growth would ultimately prevail on the entire land surface, provided the interference of animal or human life were checked.

This interference, however, has reduced the forest area in all parts of the world. It has, no doubt, been largely instrumental in creating the vast prairie regions and treeless plains which are found on every continent, and which, but for the continued interference, would gradually, at least within geologic ages, reclothe themselves with tree-growth, with few exceptions.

If originally the land area represented an almost uninterrupted forest area, animal and human activity has changed the face of the earth considerably. This change has taken place partly to satisfy the needs of increasing masses of population for food areas, partly without such need by reckless destruction; so that density of population cannot alone account for present distribution of forest areas, but historical development of the people, their progress in civilization or relapse into comparative barbarism and natural conditions of the countries have had a bearing.

Thus, while Norway and Sweden, with scanty population showed, until recently, when an active export business of wood reduced their forest areas, a large proportion of woodland; in Spain and Greece, although the population diminished with the decline of culture, reforestation has not increased in proportion, and we find small forest area together with scanty population. In Germany economic development and early recognition of the value of the resource and necessity for its rational use and management has preserved a proportionately large area.

In the United States the proportion of forest area to population since its settlement by European races has rapidly declined. Here almost one-half of the continent had by adverse climatic conditions, supplemented probably by the destructive agencies of beast and man of earlier civilization, been deprived of its tree-cover.

To such an extent has human activity reduced forest areas that in those countries where it has been most active the proportions have dwindled down to even three per cent. of the land area.

Taking Europe altogether, not much over thirty per cent. or 2½ acres per capita remains in forest, and in the United States the forest area represents probably not more than twenty-five per cent. or seven acres per capita of population.

The demand for forest products is perhaps nowhere greater than in the United States, probably not less than six to eight times as large as in Europe.

In Germany, with a population at least twelve times as dense as the United States—and hence the need of strict economy with all exhaustible resources—the annual consumption per capita may be set at round 45 cubic feet.

The annual production of the well-managed forest areas of Germany is found to average 55 cubic feet of wood per acre; there should, therefore, be 0.8 acres per capita, which very nearly is the case, (0.79 acres), the small deficiency being made up by imports, the excess of imports over exports being about 60 million cubic feet. In the United States we use simply the accumulation of material through centuries in the virgin forest, the second growth furnishing but a small part, and of management for reproduction or increased yield there is as yet no sign.

In the virgin forest the product per acre varies to such an extent that it would be impossible to make even a reasonable guess as to available supplies; some of the pine forests of the South may cut no more than 200 or 300 cubic feet, while some areas on the Pacific Coast may yield 15 to 20,000 feet and more. If we apply the experience of Germany as to possible annual wood production per acre, we will find that our present forest area, if properly stocked and well managed, would suffice to furnish our present demands of 20 to 25 billion cubic feet. But we know that the premises do not exist. The manner of utilizing the product has also much to do in calculating the efficiency of the producing area.

While, for instance, in the forest management of various German States the percentage of entire wood material may be said to be utilized in some shape or other; in the United States a very large part is not utilized at all and left in the woods; and while in the German forests from 40 to 65 per cent. appears as building timber, we learn that less than 30 per cent. is the yield from the red woods of the Pacific Coast; and, take it all through, it is doubtful whether more than 25 per cent. of the actual wood in a tree is utilized in the United States

In comparing supplies and demand, it would be a mistake to place reliance on calculations of the wood accretion upon the areas under forest cover, for it is quality of material that is demanded, and not mere quantity. Not only do areas differ in their wood-producing capacities according to climatic and soil conditions, but their composition as to kinds of trees and quality of timber determines their value. Thus, while the area of forest in the United States probably does not diminish now at as rapid a rate as it used to, the value of the remaining area is very rapidly depreciated, not only by removing the accumulated supplies, but by culling the best and leaving the inferior material, by neglecting to give attention to the reproduction of the better kinds, or even by recurring fires destroying the capacity for such reproduction.

The forest furnishes firewood, building timber and raw material for the arts.

In the United States more than three-fifths of the population uses wood exclusively for fuel, and to show the value and appreciation of this class of fuel in comparison with substitutes, it may be mentioned that in Germany during 75 years from the beginning of the century the price of coal has constantly sunk, while that of charcoal has constantly increased; showing that the substitute not only did not displace, but did not even affect the valuation of wood as fuel.

The bulkiness of the material when compared with its heating power is objectionable, but other qualities make it desirable.

For building purposes, although stone, iron and other materials are used more and more, the ease of shaping wood material, the rapidity with which it can be handled, and various other qualities, will insure the use of wood for that purpose for all time. In the arts the same qualities make the use of wood desirable, and while substitutes in many cases are even preferable, in others the necessity for using them would entail grave inconveniences. The value of sawed wood material in the United States is calculated as round one billion dollars, representing an enormous amount of material. One of the drawbacks of the material is that it is comparatively bulky, and hence it is desirable not to have to transport it too great distances, especially overland, but to produce it not too distant from the centres of consumption. In the United States, with many thousands of acres of virgin timber to draw upon, the price for lumber represents hardly more than the expense of getting it out and transporting it, the material itself representing not as yet any cost of production.

II. The Forest as a Condition of Culture.

The value of forest areas in influencing climatic soil and water conditions has been generally recognized only during the last 100 years.

While there exists, no doubt, under given conditions, a relation between forest-cover and climate, all generalizations in this respect must be taken with caution, until more proof and exact data is brought by scientific methods. Climatic conditions are, in the first place, due to cosmic and terrestrial influences. Of the terrestrial influences we know mountain ranges and water surfaces to be powerful. There is not only reason to believe, and some definite measurements sustain the belief, that as far as forest-cover interferes with insulation of the earth and the movement of air currents it renders the climatic conditions within its own borders different from what they would be were the forest-cover removed. The doubt can exist only as to whether and to what extent this difference can make itself felt outside of the forest. The claims are, that a forest-cover tempers like a water surface, and, to some extent, intercepts or reduces the force of hot and cold winds with all the consequence of such action; further, that it influences, if not the amount yet in local and temporal distribution, the precipitation of rain and snow, besides exerting various minor influences.

Whatever the truth—and neither the claimants nor the objectors to forest climatic influences have brought incontrovertible proof—it is evident that the extent, composition and location of the forest must have much significance in the matter, and also that the relation of the country towards other climatic influences must either increase or decrease the significance of this factor as a climatic element. In England, under powerful terrestrial tempering influences, any forest influence would be inappreciable by comparison; poor thirsty Spain, on the contrary, deprived by its situation of the effects of modifying ocean currents, might possibly modify the extremes of temperature under which it suffers by extensive forest areas, which it lacks. While our own North Pacific coast, if stripped of her wonderful forest wealth, would not be appreciably deprived of its abundant rainfall brought by the ocean currents; properly disposed timber belts in our arid and sub-arid interior might, if not increase precipitation, at least check the excessive evaporation under which it suffers from the incessant and unchecked winds.

The cool and humid forest-cover situated on the slope toward the moisture-bearing winds may unnecessarily increase the tendency to condensation to which the currents by their mere descent are subject, while if situated on the leeward side might recuperate itself from the moist forest air, the drained current coming over the mountain. Here, by obstructing the gentle south wind, it may keep a valley longer in the rigors of winter; there, by cutting off the cooling breezes, it may make less bearable the heat of summer. So that an objectionable influence may be shown as well as a favorable one, according to local conditions.

With more assurance can we speak of the influence which the forest-cover exerts upon the soil and water conditions. Again, it is the location with reference to the configuration and geologic formation which imparts the value to the forest, and hence, again, generalization is not permissible. Here, where an excess of moisture due to subsoil conditions used to be removed by the process of vegetation, deforestation induces the formation of marshes, and in consequence unfavorable sanitary influences on the surroundings may result; there, under different conditions, where evaporation had been checked by the forest, its removal reduces the humidity of the soil and the size and continuity of springs. Remove it from the shifting sands of the coast and the formation of sand dunes encroaching on the agricultural lands is induced; burn the forest floor on the sandy gulf coast plains and you destroy its fertility; burn the litter that accumulates under the forest-cover on the mountain slopes and the waters will run riot and gully the ground; torrents, landslides, snowslides, avalanches are induced, washouts filling the valley and the river with debris, causing stow-waters and increasing, if not producing, floods.

The significance then of the forest under given conditions as an important factor in the general conditions of a country cannot be denied.

Lastly, when we consider that forest-growth is capable of producing values on ground which cannot be utilized profitably in any other way, its significance as a national resource may be considered sufficiently established by this brief exhibit. This latter capacity of forest-growth is of the more significance when we look over the world and count the waste places which man has produced. There are in France and Germany alone over 500 square miles of sand dunes, which France has shown by a reforestation of nearly 300 square miles can be profitably utilized. In Austria the waste places capable of reforestation are nearly 2,000 square miles; in Italy, 1,500; in France, nearly 10,000 square miles; in Great Britain and Ireland, over 11 per cent.; in Greece, over 15 per cent. of the area is waste, while in Germany only 2.7 per cent.

Hence, of late, all these governments strive to bring these vast unproductive areas into useful occupancy. Prussia spends $250,000 yearly in that direction. France has spent round $30,000,000 within the last 25 years in recuperating devasted forest areas, and even Prussia has, since 1843, reclothed over 50,000 acres of her steppe.

We have seen that, as a meteorological and cultural element, the location of the forest is all-important, and its most pronounced value as such element is found on the mountain-sides, on shifting sands and on the poorest soil, in general; that is to say those locations where the material product must be necessarily inferior to that of better situations and where, therefore, forestry is least profitable. They are the very areas where private activity can find satisfaction only, by reaping the natural crop. Yet here the danger from mis-management—that is a management in which no regard is taken of the simultaneous or immediate reproduction when the crop is harvested—must be the greatest, since the baring of the slopes and sand soils may mean destruction of fertility, not only of the bared but also of the adjoining areas, and increasing dangers from flood waters. Hence the interest of the community must be centered upon these forest areas.

It has been contended that the reproduction of forest-growth takes place of its own accord, and hence the interest of the State as far as material production is concerned, need be only of that general character which it has in all products and industries of the nation.

This contention, however, is erroneous if considered from an economical point of view. While culled and denuded areas do reproduce a wood-growth, this—in quality and especially in quantity per acre—is only in rare cases satisfactory and economical. The reckless squandering of material, the disregard to the condition of the area after being left by the lumberman, the practice of firing and thereby destroying the young growth as well as the fertility of the soil, are to a large extent detrimental to the reproduction of the resource, and experiences all over the world have shown that by such reckless policy recuperation can be rendered almost impossible.

As far as the production of material constitutes the forest as a resource, it is not tree-growth merely but quality of the growth that makes it valuable, just as as it is not the presence of iron but its sufficiency and quality in the ore, that makes the iron mine of value. The forest primeval contains much material which is of little or no value and large areas are required to produce small amounts of good timber, but in its reproduction it can be improved in value and yield, and that without anything but proper use and management.

From agricultural and horticultural products of the soil the forest distinguishes itself, in so far as the former in most cases are improvements upon the natural product in kind by means of human ingenuity and labor, while the natural product as it is found in the virgin forest satisfies the needs of man.

An important difference, too, and one which makes the use of the soil for forest growth as an economical element desirable, is, that while agricultural crops exhaust soils of their fertile elements, wood-growth does not rely on these to any extent, returns the larger amount of those utilized by the fall of leaves and branches, and improves thereby the soil for agricultural use.

The production of starch or sugar and albuminoids, which is the object of agriculture, takes place at the expense of the minerals in the soil which are carried off with the yearly crop, while forest products, being in the main cellulose and its derivatives, are formed at the expense of the inexhaustible carbon of the atmosphere ; and, although small quantities of the rarer minerals are also required, they are used over and over again for processes of assimilation from year to year, since the crop is not removed annually ; and when it comes to harvesting, those parts of the tree which contain most of these minerals, the foliage and litter, remain on the ground. Thus a potato field for a medium crop requires three times as much of the rare phosphoric acid as a beech growth, five times as much as a spruce forest, and nine times the requirement of an acre of pine, while the consumption of potash is nine, thirteen and seventeen times, respectively, as great.

Hence the capacity of forest growth to utilize those soils which have been exhausted by agricultural use ; and by the deep going roots mineral elements are raised to the surface and the soil improved.

Forest growth makes also less demand upon favorable topographical and climatic situation and will succeed where agriculture is not any more profitable or is impossible. Hence we may speak of absolute forest soils, that is soils which on account of their poverty, steep topography and climatic ill-favor are not fit for anything but forest-growth. The extent of what can be considered such absolute forest soil depends somewhat on the state of culture of the country. But it is a fact of highest national interest, that inferior soils and impracticable sites can be profitably utilized by forest-growth.

The main difference between forestry and other productive industries is the long period of production.

From the time of planting to the time of harvest many decades may pass and a century may not be too long. As long as it is not only wood but size and quality that is wanted, the factor of time is an important one, for it takes time to produce both size and quality. There are to be sure some uses for which timber may be grown in short rotations, as, for instance, where only firewood or posts or tanbark is wanted, but these uses are confined in extent.

When we consider not merely the virgin forest growth but a rational forest management, we find that it differs from agriculture in various financial aspects. In agriculture the soil alone is the standing capital or basis of production from which annually the interest is derived in the crop. In forestry the soil, plus a certain amount of growth, is the producing basis; only a part of the growing crop can be utilized annually, the rest, remaining for further accumulations, must be considered as part of the fixed capital.

This condition at least prevails where an annual revenue is to be derived from the business. It is of course possible to work for an intermittent revenue, waiting until the entire growth has reached the age for utilization and after harvest starting the new crop for another rotation ; but this is not the most profitable way, and in the end it may be irrelevant financially, whether we conceive the growing crop partly as a capital or simply as an accumulation of revenue which we may not utilize.

To make a regulated forest management possible and profitable, to yield sufficient annual returns and to occupy the manager fully, a larger extent of territory is required than in agriculture; hence a larger standing capital is required. Agriculture, on the other hand, while needing comparatively small fixed capital, requires a comparatively larger running capital for expenses.

The existence of this stock in forest management places it in a particular position with reference to insurance and credit systems and the question of renting.

There are dangers threatening this stock which make forest property hazardous, more or less so according to locality, kind of timber, kind of management and moral sense of the population.

In the United States the danger from fire makes forestry one of the unsafest industries, and theft, it would appear, endangers it about as much. Insect ravages are the bane of the cultivated forests of Europe. But what they will be in the United States—the El dorado of vermin—when forest management has begun in earnest and hence the damage is felt more severely, is hardly conceivable.

The damage differs in value with the age of the growth. Fire may destroy the accumulated stock and crop of centuries; insects may destroy the saplings and grubs kill the young seedling growth. Windfalls or tornadoes may interfere with the regular system of management and may make a utilization of the stock necessary before its maturity, and thus occasion an overstocking of the market and decline of values.

While there are some dangers in agriculture, such as unfavorable weather, frosts, etc., that are not at all or to less extent felt in forestry, it is there only one year's crop that suffers, while here accumulated stores are exposed to hazard.

Since the main value of forest property lies in the accumulated stock, the soil being mostly of inferior value, and this stock is most exposed to depreciation and depredation, it does not form a fit object for credit, nor is it for the same reasons a desirable property to rent. The stock is all the year round exposed to the depredations of others, hence it requires a comparatively large expenditure for protection simply. The existence of this stock is also apt to prove dangerous as far as the proprietor himself is concerned, for it offers a constant temptation to utilize it at the expense of a rational management. Necessity, folly, or miscalculation may easily diminish it, while to place it again upon its proper value and quantity is difficult. Hence, if it is in the interest of the community to maintain stable conditions of property or where the forest partakes of the protective quality, more special care in regard to the laws regulating forest property seems necessary.

Roscher says:—

"Where the sale of property becomes jobbing, *i.e.*, where it is purchased not to be managed, but to be sold as soon as possible for the purpose of pocketing the difference in price, agriculture declines; but with forests such abuse of property in soil is much more dangerous on account of the characteristics of forest management, so that here slow change of proprietorship is proportionately much more advantageous."

The labor conditions in forest management are also worthy of note. Less labor is required here than in agriculture, since cropping and harvest recur only at the end of the long period of rotation, and the work of cultivation is connected mainly with harvest of material. Yet while few laborers are needed for their full time a large number is given work at a time when work in agricultural pursuits is slack.

According to statistics from German Government forests, agriculture employs from ten to even thirty times as much labor per acre as forestry; of the class of foremen, inspectors and similiar occupations, one man is needed for every 200 or 300 acres in agriculture, while to one forest-guard 500 to 1,800, and to one district-manager 5,000 to 15,000 acres are calculated.

Altogether, the forest offers less employment to labor than agriculture; the factor of nature has more sway in it.

This may have been the reason, why everywhere, the idea of private ownership in this kind of property has developed slowly and less regard to property rights on it is paid.

Further differences between agriculture and forestry are found in the conditions of transportation and market. The bulkiness and heaviness of the material make transportation difficult and comparatively expensive, so that the cheaper grades, especially firewood, may not be profitable utilized.

It has been figured out by a good mathematician (Little) that if it were necessary to convey the amount of timber annually consumed in America from foreign ports, the entire sailing tonnage of the world would be required.

With undeveloped means of transportation, the market for wood is locally circumscribed, and hence unprofitable, an intensive utilization of the crop is precluded and the best management often impossible.

As to profitableness of the business, this depends on so many factors and conditions that it cannot be easily determined in a general way. Although the profits per acre resulting from European forest management seems exceedingly low, it must not be forgotten that this profit is derived from the poorest soils and with little expenditure of working capital.

In Prussia, for ten years, the revenue for the entire forest area of the Government was $1.92 per acre; in Saxony, $5.60; in the very profitable forest management of Zurich, $6.45; and on about 10,000,000 acres of German Government forest area, it averaged $2.89; while agricultural land brought, according to crops, buckwheat from $8.75 to $96.00 per acre tobacco, annual income.

Excepting, therefore, the poorer soil and special conditions and kinds of management (for instance, coppice management of short rotation for tanbark), agriculture is more profitable.

During the long time necessary for production in forestry, the conditions may change to such an extent that what appeared a profitable undertaking when begun, by change of circumstances becomes unprofitable. The difficulties in gauging and balancing supply and demand may also be considered to some extent less easily overcome. On the other hand, the possibility of delaying the harvest or cutting it earlier, according to market conditions, is an advantage in forestry. It is also possible to store the harvest without the detriment or expense which agricultural crops would entail.

Since forest management does not admit of rapid changes in plans and method, but requires a conservative and well-matured plan, not only should the forest manager command a considerable scientific education and knowledge, but he must have determined character which is capable of carrying through a policy upon which he has decided. Forest management implies and fosters stability and conservatism.

Having conceived the State as an association for the purpose of regulating and adjusting the differences of private and communal interests and rights, and having agreed that the preservation of favorable conditions for associated life, that the interest of the future community is as much the concern of the State as the protection of the present community; we may now more specifically define the position of the State with reference to the forest resources.

The State must be guided by the principle, that as much latitude should be left to private activity and property rights as is compatible with the interests of the community, only when this activity and exercise of property right is demonstrably and directly harmful to communal interests is State interference called for. The individual must be guided by the rejoinder of the Roman law: "*Utere tuo ne alienum noceas.*"

With increasing population and more complex civilization, it is but natural that friction of contending interests should grow more pronounced and at more points; the present socialistic and communistic tendencies are therefore a natural development from the change of conditions in social life. As elbow-room gets scarcer, elbows more frequently knock against each other and poke into the sides of neighbors. Hence more points are discovered where interests are at variance and the principle of preventing use of private rights to the detriment of the community needs to be more carefully enforced.

While with a large virgin forest-resource to draw upon and a small population, in the United States the government paid but little concern to the disposal of forest land and forest supplies; with a reduction of the latter and with increased requirements for the same, at least such ameliorative government action is called for as will aid private interest to utilize the resource more rationally and to better advantage for continued yield and future supplies.

Since, in most cases, the resource is capable of restoration, the widest latitude to private activity should be granted, and the office of the State should be mainly directed to remove hindrances to a full development of a rational forest management and offer such positive encouragement as can be given by proper protection, by fostering educational agencies, and in similar ways.

The State agencies which are employed to facilitate a knowledge of market conditions for agricultural crops and of crop areas are, perhaps, still more desirable in the case of forest areas and cut and demand, since it is more difficult to determine these.

As far as production of wood material is concerned—a profitable private industry—and the use of the soil in the most profitable manner, it may be presumed that private interest is identical with that of the community and will adjust itself accordingly; although this axiom can hardly be said to be recognized everywhere, as the poor mountain farms in the Adirondacks and elsewhere show.

It will, however, have been observed that the nature of forest property to forest management is such as to make large and continuous holdings desirable. Hence, if the State—the community at large—does not itself retain the ownership of its forest area, it should encourage the aggregation of large forest areas in the hands of strong capitalists, individuals or corporations.

The providential and restrictive function of the State is first called into play when, by the wrong treatment of a forest, a neighbour may be injured in the enjoyment of his own property, or when the cultural conditions of whole sections of country are endangered by the free exercise of property-rights on forest areas.

Whether such injury is done or is to be expected from such unrestricted exercise of private rights is often difficult to determine. Our knowledge of the relation of natural agencies is by no means so well established as to allow us definite prediction.

On the other hand, there are certain conditions under the consequences of forest destruction or forest devastation which are so well understood that State supervision in one shape or other can reasonably be claimed to be rational.

The effect of the deforestatiou on sand dunes has been experienced in Southern France and elsewhere to the fullest extent; just so the effect of mismanagement and deforestation of steep mountain sides, which demonstrably give rise to depauperization of whole districts and communities, by washing of the soil, irregular water flow and increased flood dangers. Climatic influences, with the exception of reducing the detrimental action of winds, are, perhaps, less easily demonstrated.

Such forest property, then, cannot be left to the absolute control of the private owner. Since, however, he should be compensated for the restriction which he has to suffer for the public welfare, and since the damage done or to be expected may not always be easily proved or estimated in its extent and amount, the only proper solution is State ownership of the property. And by State ownership I do not mean to imply that the State or the General Government should necessarily be understood; I mean the community—be it State, county or township—the interests of which are at stake as against the private interest. To be sure as a rule, it will be found that the interest of several towns, counties, or even states are concerned in the control of private occupancy, and the strong, immutable, conservative central government will be found the best agency to control or own the mountain forests at least. Such ownership has the advantage of securing the object in view, while any restrictions of private rights are cumbersome and difficult to enforce.

Besides, as such forests are situated mainly on the thinner soils and rugged slopes of mountains, and, hence, are not only less profitably worked, but their reproduction is connected with difficulty and, if improperly treated, may become almost impossible; they form a questionable object for private industry in which financial gain is the leading principle.

The states which have recognized most fully the need of Government control of the forest resources are the English colonies—notably those of Australia and India—states from which we can learn a good deal in methods of internal improvements. They have done more than consider the protective function of the forest, they have recognized that the uncertainty and great fluctuation of supplies which, on account of the peculiar nature of forest property, must result from private forest management, is undesirable, and hence have reserved large areas and placed them under government management.

All other civilized governments, excepting those of the American continent, have more or less applied the principles here laid down. Canada, while disposing of its forest supplies to private individuals, does so under restrictions, and reserves at least the land; Germany, with 32.2 per cent. of state forest, 18.7 per cent. of communal forest, and 30 per cent. of the private forest under more or less state supervision, thus attempts to keep secure 65.5 per cent. of her forest area. Austria, France, Italy, Switzerland, all having state forests, also control the management of, their protective forests, and the tendency everywhere is to enlarge the restrictive power of the State.

While here state-ownership and restriction of private rights is directed toward maintaining favorable forest conditions, the reforestation of devastated and treeless areas forms also a proper subject for the State.

Such State action of an ameliorative nature would be based upon the principle, that the State, the community, should act where the exertions of the single individual or even voluntary association of individuals is powerless, or private interest does not find sufficient inducement to attain an important economic object, where the communal interest is better subserved by the action of the State, when permanent institutions are to be created and managed independently of personal whim, and the State alone can insure permanence, continuity and the accomplishment of the object.

Hence the reforestation of the Western plains, for purposes of ameliorating cultural conditions, would be properly delegated to the State, especially as long as the State still controls the land necessary for such forest planting. Feeble attempts to encourage private enterprise in that direction have been made with little result, and much of the private energy expended upon the problem has been dead loss to the individual and to the nation, for the reason that only by concerted action on a large scale is successful reforestation in the arid regions to be expected.

The method of assisting private enterprise, in any other way than by creating opportunities, is the least commendable, creating as it does a paternalism which would be a bane to the development of proper self-government, and which is widely different from the communal spirit which the writer has advocated in his propositions.

Summarizing the special considerations and peculiarities pertaining to forest growth and forestry which may influence State action, they can be briefly stated as follows:

1. By its location upon mountain slopes, sand dunes and otherwise, the forest may represent a climatic and cultural condition of paramount importance, which renders its material value a secondary consideration.
2. By mismanagement or neglect the capacity for reproduction may be injured to such an extent as to make reforestation impracticable, if not impossible.
3. Forest growth improves instead of exhausting the fertility of the soil, and is capable of producing useful material on the poorest soils and sites.
4. By proper methods of utilization alone reproduction of the virgin forest superior in quality and yield can be effected.
5. Forestry differs from other industries in the long period of production, necessitating an accumulation of stocks, which is exposed to various dangers for a long period of time, and hence renders the business hazardous.
6. Forestry requires large areas and a large fixed capital, but only small running capital. It employs little labour, but furnishes employment at seasons when elsewhere labour is less needed.
7. As a financial investment, forestry is beset with many drawbacks, which render it less desirable for private enterprise; the necessity of keeping on hand a large stock exposed to danger renders it not a desirable object for financial operations.
8. Forestry engenders and requires permanence, continuity of plans, management and conservatism.

VIII

THE BEE-KEEPERS' AND POULTRY ASSOCIATIONS.

ANNUAL REPORT

OF THE

ONTARIO BEE-KEEPERS' ASSOCIATION

To Hon. John Dryden, Minister of Agriculture :

Sir,—In again presenting our Annual Report we are pleased to be able to exhibit a degree of progress and an amount of work done during the past year which is as encouraging to us as it ought to be satisfactory to all concerned.

Our membership has increased since last report about one hundred per cent., numbering now 323.

In affiliation with our Association are now eleven local societies, viz.: The Middlesex, Norfolk, Brant, Bruce, Oxford, Perth, Haldimand, Lambton, Kent, Western Ontario and Listowel bee-keepers' associations. Ten of these report 5,130 colonies last spring and 7,312 last fall, showing an increase of about 42½ per cent. This apparently small increase of colonies is quite satisfactory in view of the fact that many advanced apiarists, desiring little or no increase of stock, control and suppress the increase to a great extent by skilful management; while it is no less true that the rapid and unprofitable multiplication of colonies among a certain other class of bee-keepers is in the inverse ratio of their knowledge and skill in the business.

The amount of honey reported from these colonies for the season was 28,448 lb. of comb honey and 136,448 lb. of extracted, being an average of about 5.5 lb per colony of comb honey, and about 26.6 lb. per colony of extracted honey, or, say 37 lb. per colony if all in extracted. This is a fair exhibit of the average yield in western Ontario the past season, while in the eastern parts of the province the yield was considerably larger.

Each of the local affiliated societies received a grant of $27.25 from the parent society, to be expended in apiarian prizes at agricultural fairs, for lectures on bee-culture, advertising meetings, etc.; while each member of the Ontario received as a premium from the Association a bee smoker, which has become a necessary article in the outfit of the modern bee-keeper.

The Association made grants to the Toronto Industrial Exhibition and the Western Fair Association of $25 and $10 respectively, to be added to like amounts set apart by these associations to be awarded by them in prizes for honey and other apiarian exhibits.

The solvency of the Association is attested by a moderate balance in the treasury which will appear in the Treasurer's report that follows.

The Board of Directors of the Association held three meetings during the year, the proceedings of which appear in the Directors' Report following.

Bee-culture in Ontario is, on the whole, making very satisfactory progress, and is gradually taking its rightful place among our productive industries; and it will be found, we hope, that the Ontario Bee-Keepers' Association has done its part the past year in bringing about that result.

The chief obstacle in our path, and which seriously threatened the very existence of our favorite pursuit, has been so far removed during the past season that we are warranted in expecting to see it speedily overcome altogether. We refer to the foul brood scourge which was spreading rapidly in the province till we commenced a vigorous warfare against it under the provisions of the "Act for the Suppression of Foul Brood among Bees" which the Ontario Legislature was good enough at its last session to pass in answer to the prayer of this Association. The work we have since done under that Act in suppressing the ravages of foul brood in this province duly appears in our Foul Brood Inspector's Report in the following pages.

Bee-culture being a branch of agriculture, we naturally expect to see it carried on principally in connection with other agricultural pursuits, and this is generally the case in Ontario, there being but few exclusive apiarian specialists. This fact, we submit, renders our present advanced position in the science and art of apiculture all the more creditable.

In our apiarian appliances, methods and manipulations we are up to any other country in the world, and ahead of all others in our legislation and work towards suppressing foul brood.

The annual product of honey in this Province now falls but little short of a half million pounds, which at the low average price of 10 cents per lb. represents fifty thousand dollars. And when it is remembered that this product is not, like other agricultural products, wrested as it were from the farmer's capital—from his land to leave it impoverished—a product which, if not secured by the apiarist, would be practically lost, the importance of the industry from an economic standpoint will be conceded. And this will be all the more readily admitted when it is also remembered that honey is the most wholesome and palatable sweet produced in the whole laboratory of nature. It is not merely a luxury. Physiologically it is a staple article of food and practically it is becoming so.

ALLEN PRINGLE, President.
W. COUSE, Secretary.

ANNUAL MEETING AT ST. CATHARINES

The annual meeting of the Association was held in the Court House, St. Catharines, on January 7th and 8th, 1891. The first session commenced at 3 p.m. on the 7th, Allen Pringle, President, in the chair.

Before commencing regular business a half hour was taken up with the "Question Drawer."

PARIS GREEN ON POTATO VINES AND FRUIT TREES.

F. A. GEMMILL asked which was more injurious to the bees, the sprinkling of fruit bloom or potato vines with Paris green?

J. B. HALL said he had frequently seen the bees sipping the dew from the potato vines.

J. G. GRAY thought if the Paris green dried on the leaves the bees would chew the leaves.

J. B. HALL suggested that the dew moistens the poison on the leaf.

The PRESIDENT said that although he had used Paris green for several years on his potato vines, he never saw any evil effects to the bees. The spraying of fruit trees should be done *just after the bloom is off* and not before; to have its legitimate effect in preserving the fruit it must be put on at the time when it will do the bees no harm and that is just after the bloom is off.

Mr. SHANTZ said that at a recent meeting of the Fruit Growers' Association Dr Beadle had stated that the proper time to spray was just before the fruit bloom.

The PRESIDENT said there surely must be some misunderstanding about that.

[Dr. Beadle has since explained his position. He meant that for the apple scab fungus it was best to spray with Eau Celesti before the flowers open and after they have fallen,]

J. K. DARLING said the time to spray was after the petals fell.

The formal business of the meeting was now proceeded with by reading the minutes of the previous meeting which were confirmed.

REPORTS OF DIRECTORS, SECRETARY AND AUDITORS.

The Board of Directors reported as follows:

During the year there have been three meetings of the Board—the first at Belleville, immediately following the last annual meeting, for the purpose of appointing the officers and committees, and arranging for the annual premium to members of the Association for the year 1890, which was a No. 2 smoker, supplied by the D. A. Jones Co. The President, Secretary and Treasurer were appointed an executive committee, and they gave grants to the Toronto Industrial Exhibition ($20), and to the Western Fair Association ($10), to be expended in prizes for honey, etc., and arranged the programme for the present meeting. Mr. McKnight and Mr. Emigh were appointed as the representatives of this Association on the Board of the Toronto Industrial Exhibition.

Mr. Gemmell was appointed to represent this Association on the Board of the Western Fair Association.

St. Catharines was chosen as the place of next meeting.

The President and Secretary were appointed a printing committee, and a thousand circulars were printed and sent out through the province inviting membership in the Association, with good results.

A special meeting of the Board was called in Toronto in April for the purpose of appointing an inspector and sub-inspector under the "Act for the Suppression of Foul Brood," when Wm. McEvoy, Woodburn, and Samuel Bray, Alliston, were appointed to the positions of inspector and sub-inspector respectively. It was thought advisable that a committee be appointed to arrange for the preparation, printing, and distribution of a pamphlet on Foul Brood, its cause and cure, and F. A. Gemmell, F. H. Macpherson, D. A. Jones and Allen Pringle, the President, were appointed to carry out that business. This committee waited on the Minister of Agriculture, and arranged for the distribution of such a pamphlet, embodying the Act which had just been passed, and the pamphlet. "Foul Brood among Bees," having been prepared by the committee, was printed by the Department of Agriculture, as an official Bulletin, (No. XXX.), and was distributed to some 6,000 to 7,000 bee-keepers throughout the province. At the urgent solicitation of the German bee-keepers in Western Ontario communicated through the inspector and President of this Association, the Department also generously printed a small edition of the bulletin in German to meet the wants of these citizens. By-laws for the guidance of the inspectors were also passed at this meeting.

The third meeting of the Board of Directors was held at St. Catharines on January 7th, 1881, previous to first session of annual meeting. The membership for the past year has been the largest since its inception, numbering 323, and up to this date (Jan. 7th), the renewals of membership for 1891 (85) are the largest ever before reported at an annual meeting.

During the year eleven local associations affiliated with the parent society, and these represent a membership of 215.

The Treasurer's report shows a satisfactory state of the finances.

The Association is in excellent position, and it is hoped that our successors in office may continue to keep up the interest that the present Directors have endeavored to maintain.

All of which is respectfully submitted.

The Secretary reported $323 received in membership fees, and $55 from affiliated societies.

Abstract statement of receipts and expenditures of the Ontario Beekeeper's Association for the year ending the 7th January, 1891 :

Receipts.			Expenditures.		
1890.		$ c.	Aug. 16.		$ c.
Jan. 7.	To balance as per last audit	299 51		By grant to 11 affiliated associations	$299 75
" 7.	" membership fees for 1890	378 00		" Toronto Industrial Exhibition (grant)	25 00
Aug. 25.	" Government grant	500 00		" Western Fair (grant)	10 00
				" disbursements connected with foul brood legislation	176 10
				" secretary's salary	50 00
				" disbursements for smokers to members	257 45
				" printing, etc	30 75
				" travelling expenses, members of board	184 40
				" sundry disbursements	92 18
					$1,125 63
				To balance	51 88
					$1,177 51
		$1,177 51		By balance	$51 88

R. McKnight,
Treasurer.

Audited and found correct this 7th day of January, 1891.

A. W. Humphries, } *Auditors.*
D. Anguish, }

The above Reports of the Directors, Secretary, Treasurer and Auditors were duly received and adopted.

THE PRESIDENT'S ADDRESS.

The following address was delivered by the president, Mr. Allen Pringle, of Selby :

I shall not consume much of the time of this meeting in making what is called the president's address. You were kind enough to place me in this position a year ago against my inclinations, but having accepted the office I felt in duty bound to discharge its functions faithfully. This I have endeavored to do throughout a year of unusual responsibility and work. Not having been much accustomed to official work of any kind—though well drilled and, I may say well-worn, in plenty of work of other kinds—I took the presidential chair of this society with some misgivings, yet with a vague impression that the position was a merely formal sinecure where the president was just a figure-head, ornamental or otherwise, as the case might be, but with little or nothing to do. That, however, proved a mistake.

I think I am quite safe in saying that the past year has been the most important one in the history of Canadian bee culture with the exception, perhaps, of the year we sent over tons of Canadian honey to the Indian and Colonial Exhibition in the Mother Country.

My own impression, however, is that even that creditable achievement must stand second in importance to the work of the past year in the bearing both may have on the future of Canadian apiculture, inasmuch as the plague we have been fighting would ultimately destory the pursuit were it left alone.

Allow me briefly to review that work. At our last annual meeting it became evident —not so much from the public proceedings as from the private conferences of the members—that the disease known as *foul-brood* had already firmly fastened itself on this province. This was a surprise to me at the time, as so little had previously been said on the subject in the papers and at the conventions. That surprise ripened into astonishment almost to dismay as the year rolled on and the evidence of the prevalence of the scourge accumulated. Fortunately, the Belleville meeting decided upon a vigorous course of action, Mr. F. A. Gemmell urging such a course. As most of you are aware, a deputation was appointed to interview the Government and urge the passage of an Act to aid the "Ontario Bee-Keepers' Association" in suppressing the disease in this province. This was all done, the Act secured, and an official inspector and sub inspector appointed within about three months of the first move at the annual meeting. But although the work was rushed through, it seems to have been fairly well done as subsequent events have amply demonstrated. While the "Act for the Suppression of Foul Brood Among Bees" may not be perfect, it is worthy of note that although it has now been in active operation for months, with difficult cases amounting to crucial tests arising, no serious defect has as yet appeared or been pointed out. In England it would take them, I should think from their order of going, some years to compass a work like that from start to finish ; and as for our near neighbors over the lake—near and yet so far—who have the merited reputation of being so smart and enterprising and go-ahead-ative, they have not commenced yet, though the work is no doubt needed there just as much as it was here. If, however, they do not go to their duty in this urgent matter soon, it will be no fault of mine as I have been firing away at them on this score of late and intend to keep it up in spite of tariff walls and McKinley bills as well as Uncle Sam's proverbial self-complacency which knows no short-comings. I intend also to try and wake up the stolid Britishers that they may learn more on this subject and proceed to work, for according to their journals they do seem to have some very singular notions on the foul-brood question. If our inspector and Mr. Jones could only get among them and our cousins south for a while as foul-brood doctors they would soon see the absurdity of many of their ideas about the disease and the futility of their remedies to cure it.

Now, should this reach the eye of either Brother Jonathan or John Bull he need not go off in a tangent, for we have just as good a right to preach and teach as either one of them; especially as we have the hard facts as solid proof behind us to back us up. Both of these highly esteemed "kith and kin" have lately through their journals been trying a shot at our Act, our inspectors and our methods, but nobody it seems is hurt and nothing has given away. One of them (he to the South) thinks our cure don't cure at all, while the other in the East thinks the doctor carries about with him and deposits more foul-brood than he cures. On both points Brother Jonathan and John Bull must be set right.

Meanwhile we will now take a look at the facts of our summer's work and see how they scatter the two aforesaid assumptions like chaff! I shall not trench on the inspector's ground as it is his duty to make a full report of his official work to this meeting, which he is, no doubt, prepared to do. The general facts, however, to which I must refer, are these : As soon as our bill became an Act and became law, if not a little before the final touch, our inspector, Mr. Wm. McEvoy, and sub-inspector, Mr. Samuel Bray, were duly appointed by the board of this society. Applications for the inspector's services began at once to come in, and under our instructions he began his official work in May last and continued with but few intervals till the cold weather in November stopped the work for the season. So far as I have been able to learn from all quarters, the inspector's mission has been a complete success, not only in the primary work of curing foul-brood in the hundreds of cases treated, both by personal manipulation and instructions, but in the work of little less importance, of educating those with whom he came in contact in regard to the prevention and successful treatment of the foul disease. The Foul Brood Bulletin which had been prepared by us and issued by the Department of Agriculture and distributed among six to seven thousand Ontario bee-keepers, was also the means of diffusing much valuable information on the subject, and our thanks are due the Minister of Agriculture and Mr. Blue, the Deputy-Minister, for their services in this matter.

I find that the inspector has also succeeded in removing the misapprehension, prejudice, and even hostility with which many at first regarded him and the Act; and by his conciliatory methods and his readiness always to help, he has gained the good-will and confidence of those even who were at first obdurate and hostile. Many, very many, as I well know from an ample correspondence, are filled with gratitude, not only to the inspectors, but to all who helped through the law which has worked so well in their interests and relief. This is, indeed, encouraging, and we may hope by a persistent continuation of our efforts to succeed in another season or two in getting the foul-brood pest, if not completely suppressed, at least, under control.

But assuming our whole duty done, and when our work may be accomplished in suppressing foul-brood in this province, there is still a serious danger threatening us from our neighbors to the South. This has been on my mind for some time, though I am in no direct danger myself, as I have never imported a bee of any kind from the United States; still, others do, all over the province, and hence the great danger. This is one reason why I have been trying of late to arouse the bee-keepers of the United States to a sense of their duty to themselves, and to us if they wish to continue the exportation of bees, honey, and supplies to us. I have reminded them of what we were doing, of the danger, and of what we expected them to do. We do not wish to be harsh or unneighborly, but we must protect ourselves. It looks as though we must have some further legislation to protect us from this danger, and the move made recently in that direction by the Oxford and Perth Bee-Keeper's Associations is, I think, timely. I have no doubt that the Dominion Government will do for us whatever is necessary to be done, as the Ontario Government has already so freely done.

When the inspector's final account for the season came to me a few weeks ago, I confess I was somewhat dismayed to find that with the previous account which had been paid it considerably exceeded the amount of the government grant made for the payment of the inspectors. However, as I was satisfied by a perusal of the account in detail, and from other sources of information, that no unnecessary work had been done and no unnecessary expense incurred, I placed the whole matter before the Minister of Agriculture and also the Deputy-Minister, and am glad to say that they readily assented under the circumstances to pay the full amount of the inspector's and sub-inspector's bill, money which has been well earned to good purpose.

The past honey season in Ontario seems to have been fair on the whole, some localities yielding abundantly, others good, and others poorly. We have no reason, however, to complain, seeing that some other countries fared so much worse.

The prospects for forage next season are good, and as the bees are wintering well so far, we may reasonably hope for a good crop the coming season.

MUTUAL CONGRATULATIONS.

At the conclusion of the president's address, the mayor of St. Catharines, who had entered, was called on, and delivered an address of hearty welcome to the Association which, among five or six associations which had visited St. Catharines during the past two years, was, he said, no less welcome than any of them. The mayor, in referring to the advantages which St. Catharines possesses as a place of residence, dwelt especially on its excellent system of waterworks, constructed on the natural principle of gravitation. He regarded the system as among the very best in Canada, and the water of excellent quality. He referred, in closing, to an old apiarian veteran of St. Catharines, Mr. Hellems, as "the father of bee-keeping" in their city, who had done much to create an interest in bee-keeping among them.

The PRESIDENT, on behalf of the Association, thanked the mayor for his presence among them and for his kind address of welcome, also for the interest displayed by the city in tendering the Association the use of the comfortable and commodious hall for their meeting. Alluding to what the mayor had said regarding St. Catharines fine system of water-works the president urged the vital importance of pure water for culinary and domestic purposes, in preserving health and avoiding disease—that impure water caused a vast amount of sickness and premature death, which might be avoided and many doctor's bills saved by a little intelligent care and a comparatively trifling outlay. Every family should have a good filter which would purify soft water and render it wholesome for drinking and cooking purposes. He had a filter which had been in use in his family for upwards of twenty years, having been re-packed but three or four times during that period. Of course the ordinary water filter will not deterge mineral impurities held in solution—will not render hard water soft, as that requires distillation—but it will purify rain, river, or cistern water. He advised that every family get a filter.

Mr. HELLEMS, the old apiarist referred to by the mayor, was called upon, and said he had kept bees for over fity years, commencing to handle them when but ten years of age, and without veil, gloves, or smoke.

FOUL BROOD NOT CAUSED BY THE IMPORTATION OF QUEENS.

D. A. JONES, in touching a point of the President's paper, said he was satisfied that it would be a very difficult thing to prevent the importation of queens from the United States and foreign countries. No danger of foul brood from the importation of queens need be apprehended if the queens are sent with *food of sugar stores*, and if those getting them will be careful to destroy *all* the bees which accompany her. It was Mr. Adam Grimm who gave this matter a thorough test. He had 200 colonies, all more or less affected with the disease, and the queens in many of them were worth at that time from $10 to $15. He did not wish to do away with his queens, and he experimented and found he could put the queen in a clean colony with no danger of giving it the disease.

RESOLUTIONS.

It was resolved on motion of R. McKNIGHT, seconded by S. CORNEIL, That the President and Secretary prepare a full report of this meeting, including all the papers read, and forward to the Minister of Agriculture, together with the usual report.

It was resolved, on motion of F. H. MACPHERSON, second by S. CORNEIL, That this Association desires to place on record its appreciation of the services rendered this Association by the Minister of Agriculture, in the matter of the passage of the "Act for the Suppression of Foul Brood," and for the generous distribution of an official bulletin relating to the cause and cure of the said disease, and that this resolution be embodied in the report to the Minister of Agriculture.

It was resolved, on motion of R. McKNIGHT, seconded by J. K. DARLING, That we continue in affiliation with the North American Bee-Keepers' Association.

UNPACKING BEES.

J. B. HALL inquired—"What is the best time to unpack bees wintered outside?"

Mr. F. A. GEMMELL thought about the 1st of June, or just before the swarming fever.

Mr. P. BUSSEY leaves packing on till they hang out, and then takes the top packing off.

Mr. R. McKnight thought the question admitted of two answers. If they are in single clamps he would not remove the packing at all, if it is not inconvenient to work with them. If packed in clamps of several colonies together, he would unpack them whenever it was found necessary to separate the clustered hives to prevent confusion. He had 14 individual cases, and he keeps the bees packed in them until he wants to get at the hives readily for manipulation. He always leaves them packed as long as possible. He thought the individual case the best.

Mr. Wm. McEvoy packs on summer stands in single clamps.

Mr. A. W. Humphries knew of a friend who never unpacked his bees at all, and who always had good success. He kept them in a bee-shed facing the east in three tiers, separated by divisions in the front, and he manipulated them from the back of the hive. In 1889 he had 24 colonies, increased to 36, and took 500 lb. comb and 1,100 lb. extracted honey. In 1890, which was not so good a season, he had 35, increased to 37, and took 250 lb. comb and 1,100 lb. extracted. As his colonies increased he extended his shed.

P. Bussey thought the hives should never be more than four inches from the ground in the honey season.

THE BEST PACKING.

The question, What was the best packing? was asked.

Mr. S. Corneil, in the language of a Scotch bee-keeper in the *British Bee Journal*, thought "the best packing for bees is bees"—when the hive gets full, then unpack.

W. A. Chrysler said in Kent county chaff-packed hives were considered the best; the nights were cool and the days raw and windy in spring and early summer. They kept the covering over the top till June 10th or 15th.

Mr. D. Anguish used chaff-packed hives right through the summer, with four inches of packing.

Mr. S. Corneil considered it best to protect by means of permanently packed walls, which will not make the hives toc unwieldly. He believed he had the warmest hives in Ontario. They were packed with cork dust, were not more than 17 inches square outside, and when filled with combs did not weigh more than 22 or 23 pounds. The outside walls were of $\frac{5}{8}$ inch lumber; then came $1\frac{1}{8}$ inch cork-dust; then 3 ply of carpet felt paper, and then the inner wall of $\frac{1}{8}$ inch picture-backing. The entire wall was but $2\frac{1}{3}$ inches thick. He was willing to test them against any known hive for heat-retaining qualities.

Mr. J. Myers used flax chaff for packing, but it drew dampness.

Mr. R. McKnight was opposed to chaff-packing. He believed cork-dust the best; and he believed also that he was the first in the world to recommend it. Chaff draws damp, and it becomes an absorbent when used over the frame. An absorbent was not what was wanted, but something that would resist moisture. Cork was always dry. Dry leaves were better than chaff, but the cheapest was saw-dust taken from thoroughly dried lumber, such as is usually ripped up in planing mills.

Mr. D. Chalmers wintered in three different ways—in house, large clamp, and in individual clamp in summer stands—but preferred the latter. He was trying dry wood ashes as a packing, and hoped it would turn out well.

Mr. S. Corneil said if Mr. Chalmers would look in the Encyclopædia Britannica he would find that dry ashes was one of the very good non-conductors, and will retain heat.

Mr. J. Myers had tried cork-dust and found it good.

Mr. S. **Corneil** said the objection to cork-dust was the difficulty of obtaining it. He had procured 500 pounds in Rochester, which cost him 5 cents per pound and the freight. If there was likely to be enough demand for it, a firm in Toronto had said they would put in a machine for grinding it.

The **President** said that with the exception of cork-dust, which was the best, he had found that dry fine saw-dust was the best available packing.

A protracted and desultory discussion ensued on out-door *vs.* in-door wintering, when Mr. McEvoy, who was strongly in favor of out-door wintering, insisted upon a vote being taken on the subject, which seemed to show a majority in favor of wintering outside packed on the summer stands.

HONEY PRODUCING PLANTS.

The **President** called the meeting to order at 7.30 p.m., and called on Mr. **McKnight** for his paper on "Honey Producing Plants," which he read as follows :

When requested to prepare a paper on honey producing plants, I felt the duty to be a difficult one. The more I looked into the subject the more apparent did the difficulty become, not because of the meagreness of the subject, but because of its magnitude. A little investigation will reveal the fact that honey producing plants are greatly more numerous and widely diffused than most of us have any idea of. We all know the classes of flowers from which the greater part of our surplus honey is collected, and have some acquaintance with the relative richness of their nectar producing capabilities ; but few of us have any conception of the vast variety of plants that contribute to the simple wants of the bee. They include all and more than all that require the visitation of insects for their fructification and continued existence. Moreover, it is a recognised fact among scientists who have devoted much time to the investigation of botanical mysteries that flowers once devoid of perfect nectaries, and wanting in the functions necessary to the abundant production of honey, may be so changed through time and selection as to become so. This being the case, it is possible that flowers that now regale the bee with their sweet exudations may in time loose their power to supply their liquid attractions, and possibly pass out of existence. It must be borne in mind that honey producing plants are not limited to those only whose flowers are visited by the bee, the flowers of many honey producing plants—their nectaries and the modification of their nectaries—being so arranged that the bee cannot extract the honey therefrom, when it is easily accessible to other insect tribes. Then again there are families of plants that yield nectar not found in the blossom—that, popularly speaking have no blossoms. The common bracken may be cited as an example. A sweet liquid is oftentimes exuded from the leaves of a great variety of trees and shrubs, and appropriated by the bee. It is, however, generally taken by it at second hand, being first collected by myriads of tiny insects, and subsequently expelled from their bodies in a modified form, when it is popularly known as honey dew. It is therefore manifest that for me to attempt to enumerate the honey producing plants even of my own neighborhood would be a hopeless task. Indeed I am persuaded that no bee-keeper or botanist has yet accomplished the work of naming the entire honey producing plants of this or any other country. A tolerably complete list of those best known found on page 386 of Langstroth on the Honey Bee, and revised by Dadant, is appended. To this I refer those who are curious to learn the names of the best honey producing plants of North America.

HONEY YIELDING PLANTS.

Compiled by Langstroth and revised by Dadant.

Compositæ—
Dandelion.
Thistle.
Chamomile.
Snowflower.
Ox-eye Daisy.
Golden-rod.
Coreopsis.
Lettuce.
Chickory.
Boneset.
Iron Weed.
Indian Plantain.
Fire Weed.
Aster.
Burr Marigold.
Spanish Needle.
Cone Flower.
Isatis tinctoria.
Star Thistle.
Thoroughwort.
Butterweed.
Sneeze Wort.
Blue Bottle.
Ragweed.
Varieties of Echinops.

Leguminous—
Judas Tree.
Locust Tree.
Honey Locust.
Wistaria.
Clover—white, red and alsike.
Melilot.
Alfalfa.
Pease.
Beans.
Vetches.
Lentils.
False Indigo.
Partridge Pea.
Wild Senna.
Milk Vetch.
Yellow Wood.
Mesquit Tree.
Cleome—integrifolia and pungens.

Labiate—
Sage.
Mint.
Ground Ivy.
Horehound.
Motherwort.
Horse Mint.
Basil.
Hissop.
Bergamot.
Marjoram.
Thyme.
Melissa.
Dead Nettle.
Brunella.
Pennyroyal.

Rosaceous—
Wild Rose.
Cherry.
Plum.
Apricot.
Apple.
Pear.

Rosaceous—Continued.
Quince.
Hawthorne.
Blackberry.
Raspberry.
Strawberry.
Juneberry.
Cinquefoil.
Bowmansroot.
Queen of the Prairie.
Meadow Sweet.
Pyracantha.

Polygonous—
Buckwheat.
Lady Thumb.
Rhubarb.
Sorrel.
Knot Weeds in variety.

Borage Family—
Borage.
Viper Bugloss.
Comfry.
Phacelia.
Virginia Lungwort.
Hound Tongue.
Gromwell.
False Gromwell.

Scrophularia—
Simpson Honey Plant.
Veronicas.
Yellow Jassamine (poisonous).

Asclepiadaceo—
Milk Weed.
Silk Weed,
Asclepias Syriaca.
Pleurisy Root.

Cruciferous—
Rape.
Mustard.
Cabbage.
Radish.
Candy Tuft.
Stock.
Wall flower.
Moonwort.
Sweet Alyssum.
Cress.

Ericaceæ—
Blueberry.
Sour Wood.
Laurel.
Clethra.
Alnifolia.
Cowberry.
Huckleberry.
Whortleberry.
Gaultheria Procumbens.

Valerianaceo—
Valerian.
Lamb Lettus.

Onagraceæ—
(Primrose Family.)

HONEY YIELDING PLANTS.—*Continued.*

Onagraceæ—Continued.
- Gaura.
- Œnothera.
- Willow Herb.

Liliaceæ—
- Lilies.
- Asparagus.
- Star of Bethlehem.
- Lily of the Valley.
- Solomon's Seal.
- Violet.
- Night Shade.
- Garlic.
- Onion.
- Crocus.

Malvaceæ—
- Mallow.
- Hollyhock.
- Cotton.
- Abutilon.

Caprifoliaceæ—
- Honeysuckle.
- Snowberry.
- Arrow Wood.

Cucurbitaceæ—
- Cucumber.
- Melon.
- Squash.
- Gourd.

Umbelliferæ—
- Parsley.
- Angelica.
- Lovage.
- Fennel.
- Parsnip.
- Coriander.
- Cow Parsnip.

Caryophyllaceæ—
- Pink.
- Licknis.
- Chickweed.
- Saponaria.
- Rib Grass.
- Goosefoot.
- Blue-eyed Grass.
- Corn Flag.
- Buckthorn.
- Barberry.
- Sumac.
- Grape Vine.
- Polanysia.
- Button Weed.
- Mignonette.
- Teasel.
- Skunk Cabbage.
- Water Leaf.
- Hemp.
- Touch-me-not.
- Amaranth.
- Crowfoot.
- Willow.
- Poplar.
- Oak.
- Walnut.
- Hickory.
- Beech.
- Birch.
- Alder.
- Elm.
- Hazelnut.
- Maples.
- Horse Chestnut.
- Persimmon.
- Gum Tree.
- Dogwood.
- Button Bush.
- Cyprus.
- Liquidambar.
- Linden.
- Aylanthus, etc.

HONEY DEW.

Mr. F. A. Gemmell asked with reference to the secretions found on willows, what it was the insects lived on, and if the secretion went through any change before being exuded and taken up by the bee.

Mr. Wm. McEvoy, thought that honey dew was atmospheric. He had found the secretions on the leaves of trees, but could not find but one or two of the aphides.

Mr. S. Corneil thought if Mr. McEvoy had gone higher up the tree he would have found millions. In the fall of 1886 he was away from home several months, and left his bees in charge of others. That fall the aphides had come in bigger flocks than ever, and his bees gathered much honey dew. The colonies were doubled down to 180, and some of the honey dew was fed to those deficient in stores. The smell was horrible and the mixture was as dark as black-strap. In the spring his 180 colonies had dwindled down to 50 to 60. He had exposed some of the combs, but there were no bees around Lindsay that would rob them.

Mr. J. K. Darling corroborated what Mr. Corneil said. The aphides live by puncturing the leaf or stem. The liquid is exuded from some little horns in the rear. He used to blame the ants for killing his cherry trees, but he had since found out that they were going up the trees to milk the aphides.

Mr. D. A. **Jones** said that when Prof. Cook visited Beeton some years ago, they had gone into the bush near one of the out apiaries and cut off branches, on the leaves of which were thousands of these aphides, and when exposed under a microscope they could be actually seen puncturing the leaves.

Mr. **Wm. McEvoy** asked how it was that the honey dew was most plentiful during dry weather?

Mr. **J. B. Hall** thought the reason was that in wet weather the honey dew would be washed off the leaves; when dry, the exudations dry on the leaves, and in the mornings when wet by the dew the bees gather it.

Mr. **McKnight** believed that the honey dew was due to atmospheric conditions, but the saccharine matter comes from the plant and not from above.

FOUL BROOD INSPECTOR'S REPORT.

Mr. **McEvoy**, the inspector, made an oral *ex tempore* report to the meeting, but subsequently made the following duly attested written report:—

I commenced my official work the 29th of May last, and, with the exception of about six weeks, I was out until the first week in November. I visited one hundred and sixty apiaries. I found over six hundred cases of foul brood. With my help and by my orders over three hundred and sixty colonies have been cured of foul brood. I ordered four colonies to be destroyed at once, as I did not consider it safe, in the interests of neighboring bee-keepers, for the owners to try to cure. I burned four colonies in the County of Wellington. I gave two bee-keepers leave to kill or take up in the old way about twenty colonies that had foul brood. Some apparently knowingly sold foul brood colonies before the Act was passed. Two bee-keepers, so far as I know, sold foul brood colonies since the Act passed. I went to them and got them to pay back the money. I believe one of these men did not know that his colonies had foul brood when he sold the disease. In nearly every place I visited I warned the bee keepers to keep dead brood of every kind out of their hives, as foul brood was caused by the rotting of uncared-for brood, which, in my opinion, was the *real and only cause* of foul brood. I told the bee-keepers that I spoke from experience as I had discovered the cause of foul brood. I also told many that the Rev. Mr. Gruetzner, one of Canada's *best* bee-keepers, had foul brood originate in a colony right in his own apiary in New Dundee, Ontario. Mr. Gruetzner put combs of brood into a weak but healthy colony; soon after, intense heat set in and the whole colony became full of foul brood. In a letter which I received lately from Mr. Gruetzner, he says that the opinion seems almost universal in Germany that foul brood is caused by dead brood. Mr. C. J. Robinson, of Richford, New York, U.S., has, he writes, tested and proved that foul brood may be caused by rotten brood. He agrees with me as to the cause of the disease. From my discovery of the cause of foul brood, Mr. C. J. Robinson's test case and discovery, the almost universal opinions of the bee-keepers of Germany, and the discovery of the Rev. Mr. Gruetzner, of New Dundee, Ontario, I positively declare that I believe that the rotting of uncared for brood is the *whole, sole, real and only cause* of foul brood. I sent Mr. Pringle, the president of the Ontario Bee Keepers' Association, a correct account in detail of my time, livery hire and car fare from place to place. I kept a very careful account of my time and expenses. In many apiaries colonies that had been wintered in bee houses and cellars had dwindled very badly in spring. Those wintered on the summer stands in properly packed cases, with lots of bees and plenty of well ripened early stores, were far ahead of the cellar wintered colonies. I winter my colonies on the summer stands and pack with leaves from the maples and other trees. The packing is about four inches thick. I like to have *every colony crowded on about six combs of solid sealed stores*, and then leave them carefully alone until the warm weather in June comes to stay. My apiary was in the best condition in June of any I saw anywhere in the province. I am an advocate of out-door wintering when the hive is well packed with *plenty* of *both bees and sealed stores* and *not less than four inches* of good packing on every side and top, as I think this management would diminish the foul brood pest. I did all I could for every bee-keeper where I found his apiary out of order, for a healthy apiary presupposes orderly careful management. While I saw some apiaries in poor condition, and *many* almost ruined by foul brood, I saw some of as good apiaries as any one could wish for. I saw some very valuable appliances and methods in my rounds, and believe that in *many things* the bee-keepers of Canada are away ahead of any country in the world. Our supply men are turning out work in fine style, and for Italian queens we can get *very choice ones* in this country. Canada will after a while have the cleanest, healthiest and best kept lot of apiaries of any country in the world. Mr. Pringle, Mr. Gemmill and Mr. Frith deserve much credit for the way they worked and got the *Foul Brood Bill* passed. Mr. Pringle has not only looked well after the foul brood business in Ontario, but he has done his best to get the bee-keepers of the United States to make a move towards cleaning the disease out of their country. He is now trying to get the bee-keepers of England to do the same.

My time, livery and car fare amounted to	$555 50
Mr. Bray's time, livery and car fare amounted to.	31 10
Total...	$586 60

The Deputy Inspector reported to the President.

Wm. McEvoy.

Mr. Samuel Bray, deputy inspector, visited 16 apiaries in the counties of Simcoe and York, and found 65 colonies with foul brood; but, owing to the lateness of the season and robbing from diseased colonies which had been going on, he was unable to do much in the way of curing or treatment, especially in the town of Barrie, where the disease has a strong footing.—A. P.

FOUL BROOD.

At the conclusion of Mr. McEvoy's report, the President called upon Mr. S. Corneil of Lindsay to read his Paper on Foul Brood, as follows:

The subject of foul brood among bees is too extensive to be treated fully in a single paper. I shall in the first place attempt to discuss the origin of the disease, and the means by which it is spread, noticing some popular errors which have crept into the current bee literature. In order, if possible, to present this branch of the question in such a way that it may be understood correctly, I shall avail myself, as far as may be, of the work already done by some of the leading bacteriologists of the day regarding this and kindred diseases, and afterwards shall give some odds and ends which seem to be of importance with respect to the propagation, prevention and cure of the disease without attempting to exhaust these branches of the subject.

In cases where putrid chilled brood is followed by foul brood, the microbes present are of two different kinds, "septic" and "pathogenic." The term "septic" is applied to microbes or bacteria which generally live and multiply in decomposing organic matter and in dead bodies only. Bacterium termo, one of the most common of these microbes, is ever present in the air, water and soil. Septic microbes are *par excellence* the microbes of putrefaction, and for their operations chilled blood in the hive would furnish a most congenial soil,

On the other hand those microbes are termed "pathogenic" which always characterise, by their presence, a special disease, epidemic or contagious, and possessing special symptoms, such as scarlet fever and smallpox in man, splenic fever in domestic animals, and pebrine in silk worms. Unlike the septic microbes they attach themselves as parasites to living animals, and grow and multiply within the body, or on its surface, at the expense of their host. Such is bacillus alvei, the microbe of foul brood. As it has been proved by experiment that it may be sown and propagated in a mixture composed of beef-tea and gelatine, and also in a culture composed of the crushed larvæ of bees, it is reasonable to suppose that in the temperature of the hive its germs, floating in the air, or in the water in the case of drowned brood, may find a lodgment and grow and multiply in dead brood, side by side with the microbes of putrefaction. Such is the opinion of Prof. Cook, T. W. Cowan and others. Dead brood may thus become a factor in starting foul brood in hives which otherwise might escape, and this for the following reasons. In the first place it has been shown by Dr. Watson Cheyne of London that the success of the attack of contagious germs on the cells of living tissues often depends on their number. He found, for instance, that where a certain number of microbes had no effect when injected into the circulatory system, twenty-five times as many caused death. With some kinds, however, it was found that a single bacillus was sufficient to cause death. These effects are explained as a struggle between the growing cells of the animal tissues and the bacteria. In the struggle, victory will in most cases remain with the cells, and the bacteria will disappear. The writer of the article on schizomycetes in the Encyclopædia Britannica says "The living tissues of a healthy animal exert actions which are antagonistic to the parasitic invader." Pasteur might also be quoted in favor of this contention. In view of the foregoing we can see that after the microbes had multiplied in the rich soil of the chilled brood, their spores might, by a sheer force of numbers, have gained a foothold amongst the live brood, where before they might have failed to do so.

Again Cheshire says, "Pricking a needle into a diseased larva and then touching a larva in a healthy hive with it is, five times out of six, enough to start a vigorous attack." The bees would be likely to carry more or less of the matter containing foul brood germs on their antennæ and feet to healthy larvæ, and in this way spread the disease in the hive.

There is another reason why putrid chilled brood in the hive may be favorable to the attack of bacillus alvei. There is a very poisonous substance developed, as the ultimate product of the putrid fermentation of organic matter, called ptomaine, twelve millegrammes of which will kill a dog. Its effect on the cells of growing tissues is to weaken their action, and if brought into contact with living brood, by the bees, it would increase the chances of success on the part of the attacking microbes. These are the only ways in which the putrefactive matter of chilled brood can assist the spread of foul brood.

We must guard against the error of supposing that foul brood is ever produced spontaneously as the result of putrefaction caused by septic microbes, that these microbes can successfully attack living brood, or that they can in any way be transformed into the bacilli of foul brood.

The microbe of foul brood is no more produced spontaneously than are pine trees or elephants. The writer of the Encyclopædia Britannic before referred to says, "No case of spontaneous generation has withstood rigid investigation." Huxley, Tyndall, and others might be quoted in corroboration of this statement.

As to the microbe of putrefaction successfully attacking live brood, Klein says: "Microbes of putrefaction cannot exist in healthy blood and tissues." Dr. Burdon Sanderson, Dr. Ferrier and Herr J. Van Fodor confirm this view of the matter.

Neither is the microbe of putrefaction ever transformed into the microbe of foul brood. The author of "Microbes, Ferments, and Moulds." (No. 57 of the International Scientific Series) says, "Up to the present (Sept. 1885), a septic microbe has not been proved to be transformed into a truly pathogenic microbe."

Under favorable circumstances bacillus alvei increases very rapidly. Cheshire found that in his culture tubes they multiplied every twenty minutes. At this rate a single microbe would increase in twelve hours to the astounding number of over fifty three billions, and the increase in twenty-four hours would require twenty-two figures to express it. In the hive no doubt the increase would be more rapid still. A single dead larva frequently contains a billion of spores.

It has been demonstrated that while wet, the spores or seeds of the disease are not given off from the matter containing them. It is only after the matter dries up that the spores becomes floating germs in the air. Similarly, in the case of scarlet fever, the danger of catching the contagion is greater when exfoliation takes place, and in the case of smallpox when the postules are drying up.

The microbes of foul brood have been found in the tissues and intestinal canal of adult bees by Schœnfeld and Hilbert in Germany, by Cowan and Cheshire in England, and by Prof. McLain in America. Schœnfeld found the microbes in abundance in the rectum of bees. An American experimenter mixed two grains of bee fæces from a diseased hive in a quart of syrup, one half of which he fed to a hive of healthy bees ten miles off. These bees were permitted to fly under cover only. In thirteen days the disease appeared, and in four weeks the combs were reeking with foul brood. It is easy to understand how bees may distribute the germs of the disease for miles over the fields in the vicinity of a diseased apiary, by means of their excreta discharged while on the wing; and as this excreta becomes rapidly dried, how the microbes may be caught up by the winds and distributed as dust in the air over a whole country side.

The disease may be introduced into our apiaries from distant countries by the excreta of the escort bees accompanying queens. English bee-kepers say the disease was carried to them with queens from Italy, and A. J. King, late editor of the Beekeepers' Magazine says it was brought to an apariay in Cuba, of which he had charge, with queens purchased in Ontario.

It has been said that the microbes do not adhere to the bees themselves, but this has been proved to be a mistake. In 1871 Schœnfeld washed with distilled water, bees from a foul-broody colony, and found that this water contained, mouldy pieces of rotten brood.

There is a general agreement amongst those who prescribe methods of cure, that in diseased hives, the combs become contaminated, and should be melted into wax. It is agreed amongst bacteriologists that the maximum temperature required to kill mature bacteria, in water, is 140°. Many kinds are killed at a lower temperature. It has been proved that the spores, as compared with the adult organisms, possess a power of resistance to heat, in the proportion of 11 to 6; that is if 140° is required to kill the fully developed bacterium, 257° may be required to kill its spores. Wax melts at 142°, a temperature most likely inadequate to kill the spores of bacillus alvei. To what extent the disease has been spread by germs contained in comb foundation, made from the wax of infected hives will never be known.

Dessicated spores, like the dried seeds of plants, often refuse to imbibe water; in this state they resist the action of heat for a long time. It has been found that plant seeds, contained in fleeces of wool, imported from South America, sprouted and grew after the fleeces had been boiled for four hours. An examination showed that some of the seeds had not been wetted. Tyndal boiled his culture tubes for three, four, five, and in one case eight hours, without killing the microbes they contained. He afterwards discovered that by repeatedly boiling them for less than a minute at a time, at intervals of ten or twelve hours, he never failed to sterilize his cultures. Boiling hives and appliances may fail to disinfect them for the above reasons, unless the boiling is repeated several times.

Honey boils at 235°. If the boiling were repeated a few times any spores it might contain would no doubt be killed. Spores have been subjected to a cold of 180° below zero without being affected in the least.

The fully developed bacteria succumb to the influence of both heat and chemicals much more readily than their spores. Dr. Koch, now so famous in connection with the cure of consumption, says that the spores of anthrax, or splenic fever, are only killed in a five per cent. solution of phenol, when exposed to it for twenty-four hours, but that the bacilli themselves are destroyed by a solution of one per cent. A solution of one-fifth of one per cent. is the strongest that can be fed to bees. Most of the drugs recommended as remedies for foul brood will kill the mature bacteria with which they come in contact, and will prevent their multiplication, but they will not destroy the spores, when used in the greatest proportion possible among live bees and brood. When a cure is effected with drugs the different *hatches* of bacilli, so to speak, are killed by repeated applications, until there are no more spores to germinate.

A solution of corrosive sublimate, about one in one thousand, is sure death to all bacteria and spores. It is a very powerful poison, and cannot be fed to bees or used with effect as a spray, without killing the patients as well as the disease germs. One eighth of an ounce in a gallon of water may be used as a wash for the hands, smoker and other implements. Half a molasses barrel-ful of the solution will cost less than a dollar and a half. In this solution hives may be dipped and disinfected at a trifling cost, but they must be thoroughly rinsed to remove the poison. It has been recommended that one ounce of potassium permanganate be added to every four gallons of the solution, coloring it, to prevent possible accidents, arising from mistaking the solution for water, whilst it is also a useful disinfectant. Sulphurous acid, produced by the burning of brimstone, will kill exposed bacteria, but will not kill their spores.

The method of cure, by changing the bees to a clean empty hive, in the honey season, has been more generally successful than any other. It was practised by Seydell in 1767, by Voight in 1775, by Bonner in 1789, by Della Rocca in 1790, and was given in "Quinby's Mysteries of Bee-keeping," in 1865. It is contended by some that, inasmuch as the disease lurks in the honey the bees should first be placed in a state of quietude and starved till the last particle of honey in their honey sacks is consumed. Even if it were possible to know when the last particle of honey in every bee was consumed without making a post-mortem examination of each one, placing the bees in a state of quietude, in which their functional activity is reduced to a minimum, is about the poorest possible way of causing a speedy consumption of the honey carried with them from the diseased hive. Besides this there is abundant evidence to show that the vitality of bees thus treated is so reduced by want of food that the stock is found to be seriously injured for work for a considerable time. The alternative method of feeding the bees liberally during their confinement, causing them to secrete wax and build comb, is found to be more effectual in changing the contents of their honey sacks, while at the same time the bees are kept in a state of vigorous health.

The theory that the disease is most commonly communicated from hive to hive, and from one apiary to another in honey, rests on circumstantial evidence which is not conclusive to every one. Diseased hives have been robbed without the disease being carried by the robbing bees. Prof. McLain gives apparently strong reasons for believing that the disease germs most commonly lurk in the pollen. Cheshire says, "such minute bodies as bacilli, produced in inconceivable numbers in the hive, must occur in honey as an occasional contamination, but the idea that they grow in the honey is quite contrary to all evidence. They cannot grow in any fluid having an acid reaction." All experimenters find it necessary to make their cultures slightly alkaline, or else the bacteria will not grow and multiply. To settle these questions we require experiments to determine whether a large number of cultures can be freely inoculated with bacillus alvei, by the addition of honey and of pollen taken from diseased hives.

As the settlement of these questions has an important bearing on one of the agricultural industries of the country, our Association might fairly ask the Director of the Dominion Experimental Farms, and the President of the Ontario Agricultural College, to have the investigations made in their laboratories. Ordinary bee-keepers lack the time, the appliances, and above all the skill, to make such experiments for themselves. Speaking of such investigations Tyndall says, "Here as elsewhere in these difficult enquiries the sagacity which comes in a great part from nature, the skill which comes from training and the care which ought to root itself in his moral constitution, are all necessary to save the experimenter from error and to lead him to truth."

A long discussion followed on foul-brood, lasting till near midnight. A majority of the meeting seemed to question some of the positions taken in Mr. Corneil's paper regarding the propagation and spread of the disease as being contrary to the facts and to their experience.

Mr. Corneil was asked how it was that the simple plans of cure followed by the inspector and Mr. Jones were so successful if the positions taken by him were tenable.

Mr. CORNEIL said: When the air is full of these spores they will light on the bees when shaken into the clean hive. Are the spores all off after four days? It doesn't seem that they are, or at least seldom. I surmise that we all know that bees are very cleanly, and when put into this clean hive to build comb, or into a state of quietude, may they not get rid of any of these foreign matters?

Mr. Corneil was also asked if queens really did carry the disease, and replied that queens discharge fæces, that the spores are in the honey, and they pass through and are discharged in the fæces. Even though all the bees which accompanied the queen were destroyed still there might be danger.

The essayist, in his paper, had argued strongly against the possibility of the spontaneous generation of the foul-brood microbe or any other living thing, and read extracts from scientific authorities in support of his position, not embodied in the text of his paper—especially from Prof. Huxley.

The PRESIDENT remarked that while he agreed with nearly everything in Mr. Corneil's able paper, he could not agree with him as to the impossibility of spontaneous generation. The scientists, including Prof. Huxley, did not deny the possibility of spontaneous generation. They simply affirmed that they had no proof that it had taken place during the *life* history of the earth. His (the President's) own reasoning on the question was simple and conclusive. Science had established that spontaneous generation did actually take place in the past history of the earth; and if it had occurred in the past, why might it not occur again? There was a time when the earth contained no life of any kind, and was incapable of supporting life, being a molten mass of matter; but after it had cooled on the surface and a crust formed, and it became capable of supporting life, then life appeared on its surface—and appeared *spontaneously*. This was the teaching of modern science—the teaching of the very scientific authorities quoted by Mr.

Corneil. And if spontaneous generation was an actual fact in the past history of the earth nobody could with reason say to-day that it was impossible. The changed condition of the earth is not sufficient justification for such an assumption, for, as Tyndall says, matter contains in itself the " promise and potency of every form and quality of life."

REPORTS OF AFFILIATED SOCIETIES.

Reports were read from eight affiliated societies, viz. : The Middlesex, J. B. Aches, president, A. W. Humphries, secretary ; the Bruce, A. E. Sherington, president, A. Tolton, secretary ; the Oxford, F. A. Gemmell, president, Jas. E. Frith, secretary ; the Brant, J. R. Howell, president, D. Anguish, Secretary ; the Norfolk, J. P. Ryder, president, C. W. Culver, secretary ; the Haldimand, F. A. Rose, president, E. C. Campbell, secretary ; the Lambton, E. Morrison, secretary ; the Perth, F. A. Gemmell, president, A. Johnston, secretary.

The Western Ontario, Kent and Listowel societies failed to make reports, and it was moved by F. H. Macpherson, seconded by J. K. Darling, and resolved, That the secretary of this association be instructed to ask the secretaries of these delinquent societies to explain the absence of their reports, and that in the absence of a report satisfactory to the executive committee, the grant for the next year be withheld.

THE BEST HONEY AND WHERE OBTAINABLE?

The President next called for a paper by D. A. Jones, which was read as follows :

I thought that perhaps some items on honey might be interesting, as it may not be generally known that the same source of honey yields different qualities in various sections even of Ontario, and the difference is greater as we go further south or nearer the sea level. The atmosphere surrounding the plant or bloom has its influence on the honey. The moisture of the earth and the particular kind of soil also affects the color, texture and flavor. Some may think that if bee keepers all possessed the same knowledge and gave their bees the same kind of treatment, and if their entire management of the apiary was the same that honey from the same sources would be alike. This however is not so. We know of localities in Ontario where they can produce finer honey than we can get in ours, and we also know of some not equal in quality. Our range is from four to six hundred feet above lake Ontario. There are some ranges west and north of us lying south of the Georgian Bay that are between twelve and eighteen hundred feet above lake Ontario. These higher ranges are the height of land between Georgian bay and lake Ontario and include the county of Grey which produces some of the finest honey we ever saw. The locality from whence some of the extra fine samples were received is very high land although not unusually dry, but the land has a great deal of limestone gravel through it. Some of the soil is varied heavy clay loam and gravel, but the whole of it seems to contain abundance of limestone gravel which apparently tends to improve the quality of honey especially where it abounds on high lands like the above where the atmosphere is very pure. On low, foggy damp lands we have never found the honey equal in quality to that got on higher ground. It would be quite useless for us to expect honey from low lands equal to the best from the same source that has been obtained from higher grounds. I have seen some very fine honey good in color, texture and flavor from California and various parts of the United States, and also from Europe but we have samples before us from the heights of land in Ontario that are so much superior without any special care or attention that in justice to those occupying those favored spots as far as quality is concerned we must mention the fact, and from reports of the last few years we believe that fully as large or larger yields have been secured from those higher points. Perhaps limestone has something to do with increased yield, for the largest yield of honey we recollect of having being taken in Canada was from a section where the limestone rock cropped out in many places on the surface. The northern parts of the United States have many very superior localities as well as Canada, but it does seem that latitude or altitude is desirable in order to secure the finer grades of honey. I can assure you some of the finest qualities of honey in Palestine are taken from the mountains. This is perhaps the reason why many people in the East claim that the Hymettus honey is so fine. We recollect when we first went to Palestine in search of the best bees that we found bee keepers in the valleys down almost on a level with the Mediterranean sea. They told me that if I wanted the best bees I should go away up on the top of Mt. Lebanon and one kind bee keeper at Beyrout who had a large number of colonies pointed out a village about twenty miles up Mt. Lebanon where he said the bees made honey much superior, and advised me to go and get that kind of bees. I asked him if he ever interchanged bees and he said yes, and when they were taken up into that mountain they got better, and that the best bees were there. I then examined the flowers all the way up the side of the mountain and the honey in different apiaries, and found that while the honey was so dark and strong in the valley that it could scarcely be eaten, from the same source on the top of Lebanon it was bright, clear and good. I should judge that this village was about six thousand feet above the Mediterranean, although I could only estimate the distance by comparing its height with the road running over the mountains to Damascus to the north of it. I also noticed that the honey gathered in the valley at Damascus and in the Jordan valley was very much darker and stronger than that gathered up on Lebanon and Hermon. In fact, I was surprised at the superior quality of some of the honey gathered on Mount Hermon. Perhaps if we gave this matter a little more careful study and compared samples from various localities we might be able to learn some further and very interesting facts in regard to production and quality of honey.

This paper was followed by a lengthy and interesting discussion.

C. W. Post remarked that wild mustard gives a straw-colored honey.

W. Couse said that basswood honey in the State of Michigan is darker than honey from the same source in Canada.

J. B. Hall thought it was because of its being mixed.

W. Couse—They said it was basswood honey.

J. B. Hall—Yes, basswood.

J. Myers had never seen bees working on mustard.

F. A. Gemmell supposed the difference was in the character of the soil in Canada and Michigan.

RIPENING HONEY.

This subject was freely discussed.

J. K. Darling said he put his unripe honey in tin cans and allowed it to stand, then took off the lighter honey from the top.

J. B. Hall thought there should be no light honey to take off.

D. Chalmers believed Mr. Jones was perfectly right, and he thought it would be a good idea if at the next convention all the bee-keepers present would furnish samples of the different kinds of honey, so that they might be compared as to color.

D. A. Jones put the honey into ripening cans or extractor bodies, and allowed it to evaporate, after which the honey was drawn off from the bottom of the cans.

Mr. Corneil—The factors favoring rapid evaporation of honey are the extent of surface exposed, and a constant change of the stratum of air in contact with the honey. A quantity of honey having an exposed surface of ten square feet will evaporate twice as quickly as the same quantity having only five square feet exposed, other things being equal.

The PRESIDENT—Temperature is also a factor, is it not?

Mr. CORNEIL—Yes, a most important one, but I was referring only to ripeners for honey exposed to the outside air in the honey harvest, in which case the temperature would be the same. Mr. Jones favors evaporating cans which will contain honey several feet in depth, but exposing only comparatively small surface. I have three tin-lined tanks, three feet by six and one foot in depth. When these are full I have an evaporating surface of fifty-four square feet for about 3,000 pounds of honey. Another very good way is to have most of the curing done by the bees, by placing a large number of empty combs in the surplus chamber, so that the honey may have a large surface exposed to the currents of the hive. I generally put on twenty and sometimes thirty combs, besides those in the brood chamber.

Then unless the air in contact with the honey is constantly changed by currents, it becomes saturated like a sponge filled with water, and evaporation ceases. The necessary changes of air cannot take place as readily in deep cans, only partially filled, as it will in shallow tanks.

Mr. MCKNIGHT—Honey has a strong affinity for moisture, and will absorb it from the air, and become thin; therefore the larger the surface exposed the worse for the honey. I have a large double walled can which I place on the cook stove, and evaporate my honey there in a waterbath, and pack it while hot, before it can absorb moisture.

Mr. CORNEIL—Quite true, very thick honey will absorb considerable water from very damp air, but I make this statment: if two vessels of the same dimensions be filled with honey and placed side by side in ordinary air, one vessel having honey weighing only twelve pounds to the gallon, the honey in the other weighing sixteen pounds to the gallon, water will be evaporated from the thin honey and it will thus lose in weight, while the thick honey alongside will absorb water from the air and will increase in weight. If the percentage of moisture in the air is at the average, there is a medium density for honey at which it will neither absorb water from the air nor give it off by evaporation. Such honey only is fit for the market. It is about one-third heavier than water, weighing about thirteen and one-third pounds to the gallon, in the atmosphere of Ontario. If the honey is a little cold it will be stiff and appear to be dense, if kept in a warm room for some time it will appear to be too thin. A guess at the density of honey, by stirring with the tip of the little finger is not reliable. Every bee-keeper should provide himself with a hydrometer, costing only about sixty cents. With this instrument anyone can determine the density of his honey, and he will then be in a position to speak of it with confidence to intending purchasers. Occasionally the honey is sufficiently dense when extracted, but at other times it is quite thin, and will ferment unless it is evaporated. Hence the importance of being able to determine its exact condition.

R. MCKNIGHT—If a tank be placed in a garden with the temperature at a proper height on a calm day, and next day the temperature is the same but it is very windy, under which conditions will the honey ripen most quickly?

S. CORNEIL—On a windy day; change of atmosphere above the honey will be more constant.

R. MCKNIGHT did not concur in this view.

F. A. GEMMELL asked if the aroma had anything to do with the flavor?

J. B. HALL said the temperature had a great deal to do with the ripening of honey, as also has the frequent change of the atmosphere. If a better place than the comb in the hive could be found for this purpose he wanted to know it. The thin combs, and the constant change of the air over the combs, caused by the "fanning," makes it just the place. The aroma that we got with honey ripened in the hive, was what took the prizes at the fairs.

R. MCKNIGHT contended that more honey was rendered uncured after it was a month out of the combs than was extracted in a green state. The moisture has a better chance of absorption. Mr. Corneil, he said, seemed to think that there was no difference between flavor and aroma, but flavor was a permanent quality, while aroma was a floating. The aroma was the volatile principle of the essential oil from the flowers whence it is gathered. If you chew the flower you get the flavor ; smell it and you get the aroma. The aroma was at its best just as the honey was taken from the hive—it passes off in time. To preserve it seal the honey air-tight quickly. Speaking of the point at which honey would boil, he believed that Mr. Corneil was the first to announce the degree at which honey would boil—235°. The only effect that putting honey in boiling water would have, would be the loss of the aroma. To keep this, bottle the honey at once when taken directly from the hive.

CENTRAL FARMERS' INSTITUTE.

President Pringle, as delegate to the Central Farmers' Institute at Toronto, made a verbal report. He said that he had attended the institute meeting and although he got in some work on agricultural lines he got none in on the apicultural line, owing to the fact that the executive of the institute had not been notified of delegate's intention to present a paper, which, however, was no fault of his as it was too late for notice when his appointment as delegate was made. He had, however, attended to that matter for his successor delegate to the Central Institute, which would meet in Toronto the next month (February, 1891), by giving notice of a paper from our representative.

It may be stated here that a paper was read by our delegate, at the institute meeting referred to above, on "Bee Culture in Ontario," which was freely discussed, and for which a vote of thanks was tendered the delegate. Our report for 1891 will, however, be the proper place for this paper and the delegate's report.

LAST SESSION—SECOND DAY.

Election of Officers.

The following officers were elected by acclamation :

President—Allen Pringle, Selby, Ont., re-elected.
Vice-President—F. A. Gemmell, Stratford.

Directors :

District No. 1.—W. J. Brown, Chard.
" 2.—J. K. Darling, Almonte.
" 3.—M. B. Holmes, Athens.
" 4.—C. W. Post, Murray.
" 5.—S. Corneil, Lindsay.
" 6.—W. Couse, Streetsville.
" 7.—A. Picket, Nassagaweya.
District No. 8.—F. A. Rose, Balmoral.
" 9.—M. Emigh, Holbrook.
" 10.—R. McKnight, Owen Sound.
" 11.—A. W. Humphries, Parkhill.
" 12.—R. F. Holtermann, Romney.
" 13.—R. H. Smith, Bracebridge.

Auditors.—D. Anguish and J. B. Hall.

NEXT PLACE OF MEETING.

It was moved by R. Myers, seconded by F. H. Macpherson, and carried, that the city of London be suggested to the directors by this meeting as the next place for annual meeting.

It was subsequently decided by the directors that the next annual meeting shall be held in London on 5th, 6th and 7th of January, 1892, a third day having been added by resolution of meeting, moved by D. A. Jones and seconded by A. Laing.

COLUMBIAN EXPOSITION.

A letter was read by the secretary from W. T. Buchanan, Chief Department of Agriculture of the Chicago Fair, urging this association to make an exhibit at their approaching exposition.

The meeting decided to take no action in this matter until the Ontario Government decides what it intends to do as to an exhibit.

Moved by D. CHALMERS, seconded by R. A. MYERS, that the sum of $25 be tendered to President Pringle as a slight compensation for his extra services in connection with the Foul Brood Act. Carried unanimously.

The PRESIDENT was duly empowered by the meeting to appoint delegates to the next North American convention.

PROPOSED EXPERIMENTS *RE* FOUL BROOD.

It was moved by S. CORNEIL, seconded by R. MCKNIGHT, and resolved, That whereas it is generally admitted that the combs in hives infected with the disease of foul brood are contaminated, and where such combs are rendered into wax it is feared that the heat required for the purpose is not sufficient to kill the spores of *bacillus alvei*, thereby allowing the disease to spread by the use of comb-foundation manufactured from such wax ; and

Whereas, the opinion is that the spores of the *bacillum* are carried by the bees in honey and in pollen from diseased hives,

Be it therefore resolved, that the president of this Association be instructed to communicate with the director of the Experimental Farm at Ottawa, and the president of the Ontario Agricultural College at Guelph, asking them, on behalf of this association, to have the necessary experiments made to determine whether the disease may, to any considerable extent, be spread by the above means or not.

REPORT FROM THE INTERNATIONAL ASSOCIATION.

The delegates to the North American Bee-Keepers' Association reported as follows :

This organisation, which has been in existence for about twenty years, comprises in its constituency both the United States and Canada. It was intended from the outset to be composed mainly of delegates from the several states, provinces, and territories of the North American continent. It was part of the plan that local associations should send their best bee-keepers as representatives to the continental body, which was to form a sort of high court or parliament of apiculture. The original programme has never been fully carried out, and the meetings have been largely local, so far as the attendance has been concerned. The association has met twice in Canada ; once in Toronto, and subsequently (last year) in Brantford. The recent meeting was in Keokuk, Iowa. This is the first time the body has met west of the Mississippi, and the experiment of going so far away from the centre was not a successful one.

Those present were chiefly Iowa men. Though the place of meeting was close to the borders of Illinois, few came to it from that State. Fewer still came from Missouri, though that state was also contiguous to the place of meeting. Michigan had only one representative, Colorado one, Ohio three. All the other states were unrepresented. Ontario sent two delegates, Rev. W. F. Clarke, of Guelph, and Mr. R. McKnight, of Owen Sound, registrar of the county of Grey.

The association met October 29-31, holding eight sessions. It was called to order on the morning of the first day, by the President, Hon. R. L. Taylor, of Lapeer, Michigan, a gentleman educated for a lawyer, but who drifted into bee-keeping, and is now one of the foremost apiculturists in the United States. A full report of the proceedings would occupy too large an amount of space and only a brief *resume* of the more important matters can be attempted. Interesting details of "Fifty years Progress in Apiculture," were given in a paper by T. G. Newman, editor of the American Bee Journal. "Apiculture Journalism" was discussed by Mr. W. Z. Hutchinson, editor of the Bee-Keepers' Review, and a higher standard of bee-periodical literature strongly urged. The president's address which was not delivered until the second session, glanced at the past honey season, the markets and various general matters, but was chiefly taken up with suggestions about incorporating the association, and making due preparation for the approaching world's fair at Chicago.

A paper was read on the "Bee Pasturage of America," by Mr. A. I. Root, editor of Gleanings in Bee Culture. Its main purport was the newer and less known plants that yield honey. The white sage of California ; the mesquite, a small shrub or tree, bearing edible pods, and flourishing in Arizona, Texas, New Mexico, and other parts of the United States; the Spanish needle, which grows abundantly in the Middle and Southern States; sweet clover, teasel, rape, and mustard were successively spoken of and their honey-producing qualities described. In the discussion that arose on the paper, it was generally agreed that it would not pay to raise crops for honey alone, and that bee-keepers must largely depend on wild flora growing in waste places.

Dr. A. B. Mason, of Auburndale, Ohio, read a paper on "The Apiarian Exhibit at the World's Fair in 1893," which gave rise to a large amount of discussion, and resulted in the appointment of a committee which reported at a later stage of the meeting. "What I don't know about bee-keeping," was the subject of a humorous paper by Dr. C. C. Miller, of Marengo, Illinois, formerly a practising physician, but now an apiarian specialist. The one practical point brought into prominence was, that notwithstanding the great progress made by their pursuit, bee-keepers have much to learn. Rev. W. F. Clarke read a paper on "The Work of the Association: its past and its future." It enumerated a number of benefits that had accrued from the organisation, and pointed out how much its usefulness might be augmented by making it more truly representative of the best and most advanced thought in apiculture. A volunteer essay was contributed by Mr. Allen Pringle, president of the Ontario Bee-Keepers' Association, on "Foul Brood," calling attention to the prevalence of this terrible scourge of bees, and detailing what had been done in the province of Ontario by legislative enactment and vigilant inspectorship to check the progress of the evil.

The question, "Is it best to use full sheets of foundation in brood and surplus combs?" was introduced in a paper by Mr. Eugene Secor, of Forest City, Iowa, and had the effect of bringing out the views of a large number of bee-keepers in regard to this matter. Considerable difference of opinion was manifest. Some were in favor of using full sheets of foundation in both brood and surplus frames, and starters in section boxes. A few used narrow strips in brood frames, and full sheets in sections. "Fixed frames *vs.* suspended ones," was the next topic. It was brought forward by Mr. E. R. Root, of Medina, Ohio, who, having recently taken a tour among eastern bee-keepers, was surprised to find fixed frames in extensive use, and had been led to reconsider his preference for suspended frames in consequence of his observations. "The condition necessary to secure a honey crop," by Prof. A. J. Cook, of Michigan State Agricultural College, dealt chiefly with atmospheric influence, which often lessened or wholly spoiled the harvest, when other conditions were apparently favorable. This is one of the difficulties of bee-keeping which human agency is powerless to overcome. "In an apiary run for honey alone, are Italians or hybrids preferable?" was the subject of a paper forwarded by Mr. C. F. Muth, Cincinnati, Ohio. The author was warmly and even enthusiastically in favor of the pure Italian race of bees. Hybrids do sometimes develop a better aggregate of good qualities than the Italians, but they cannot be bred with any certainty, and often betray bad qualities, especially that of vicious temper. The uniform amiability of the Italian race, added to their many other excellent points, render them, on the whole, the most desirable strain of bees now available. Hybrids have usually warm champions at these conventions, but this time very little was heard in praise of them.

A question drawer was in operation, and many topics were suggested by its contents. Too many of them, however, had to do with elementary bee practice, with which the time of such a meeting should not have been taken up. Introducing queens, bee cellars; out-door wintering, doubling up colonies, sugar stores, migratory bee-keeping, combination of bee-keeping with other pursuits, the proper space between brood combs and the protection of bees from the inroads of rats, mice, and black ants, were among the more important queries considered.

The coming world's fair proved a troublesome topic, and was not settled without much difference of opinion growing out of the matter, being mixed up with the question of incorporating the association. The necessity of a government grant in order to make a creditable display forced incorporation to the front, it being felt that it was unlikely that public money would be given to an organisation that had no legal standing. The Ontario delegates contended that each state or territorial association should seek incorporation and apply for a grant of public money as the bee-keepers of their own province had done, and that then a fund for exhibition expenses should be formed by each state or territorial body contributing its quota. They also pointed out the impossibility of Canada being a joint applicant to the United States Government for an act of incorporation. Very little heed, however, was paid to these representations, and a committee was ultimately appointed to seek incorporation for the Association, and to fix its headquarters at Chicago, Ill. It is very questionable if the Eastern States will consent to this arrangement, and be content to revolve, like so many satellites, around the State of Illinois, and the city of Chicago. It is quite certain that if this plan be consummated, Canada will be forced to retire from a partnership which has been pleasantly maintained for a score of years.

We visited a farm and apiary on the Illinois side of the river, about four miles from Keokuk, the place of meeting, which has a wide reputation, and is a remarkable illustration of the possibilities of bee-keeping. The establishment is carried on by Charles Dadant & Son. Mr. Dadant, senior, emigrated from France to this country many years ago, and took up eighty acres of land, on which he still resides. Accustomed to bee-keeping in his native land, he commenced an apiary in a small way, and carried it on as an adjunct to his little farm. From humble beginnings, the apiary has grown until it now comprises about 400 colonies of bees. At an early period in the use of comb foundation, the Messrs. Dadant commenced the manufacture of this requisite, now in such large demand among bee-keepers. During the present year they have worked up no less than 80,000 pounds of bees-wax into comb foundation. The net profits of their apiary and factory last year were $5,000. Their home is very pleasantly situated in a natural grove, under the grateful shade of which their 400 colonies of bees are distributed, presenting the appearance of a miniature city. The little farm is worked after the fashion of a large garden. There are ten acres of grapes. Part of the crop is sold for table use, and the remainder made into wine, which is sweetened with honey, and retailed at the low price of $1 per gallon. The Messrs. Dadant, both father and son, are intelligent, wide awake and energetic men, who have evolved large results out of small beginnings, in a line of things which too many short sighted farmers consider beneath their notice.

All of which is respectfully submitted,

(Signed)

W. F. Clarke,
R. McKnight,
Delegates.

ELECTION OF FOUL BROOD INSPECTORS.

The meeting having decided to elect these officers instead of delegating the duty to the Board of Directors, which the Act makes optional with the annual meeting,

It was moved by D. A. JONES, seconded by A. LAING, and carried, that Wm. McEvoy be the inspector again under the Foul Brood Act, for the current year.

Moved by D. A. JONES, seconded by J. MYERS, that Samuel Bray be the sub-inspector. Carried.

CANADIAN BEE-JOURNALISM.

Mr. F. A. Gemmill, representing the Perth County Association in this matter, read a paper by J. E. FRITH on the above subject, of which the following is a summary :

The growth of bee publications devoted to the apiary was first sketched, and the journals were divided into two classes, private and public, the former comprising those published in the interests of some large dealer or company, while the latter were run on their merits as periodicals and for the benefit of the people generally. Private journalism had done much good for the apiary industry in the past in Canada, but it was now time for the assertion of independence. Private interests should no longer control the utterances of any public journal. The object of the public journal should be to make known the merits of such apparatus and methods as would be of benefit to those engaged in the business. Freer and less biased discussions would result from the establishment of such a periodical, while " booming " would be minimised, as individual interests would not dominate as in the case of a private journal. The markets would be improved, as they would not be affected by literary puffing and local considerations would not influence the editor. A public journal would have more weight with the government, as it would then indeed be the mouth-piece of the apiarists. Governments cannot be expected to accept private opinion as public sentiment. This was very conspicuous in the application for foul brood legislation, as the work had to be done entirely through public representatives. Had we a public journal ten years ago foul brood would be extinct to-day, instead of a raging epidemic. Our wants, needs, difficulties and failures could be made known, and it would not be very long before experiments at public expense for the public good would be inaugurated. The ups and downs, failures, expenses and difficulties would be shown in their true light by a journal conducted in the public interests. Societies of various kinds conduct their own journals for the common good, and with success. In fact their society periodical is their great bond of union and strength, and it keeps the whole fraternity abreast of the times. Why should not the bee-keepers of Canada have a common journal ?

The Directors were instructed by the meeting to appoint a committee to consider the paper and report at the next annual meeting—the Board subsequently appointing Messrs. Gemmell, Frith and Corneil for that purpose.

MANAGEMENT OF OUT APIARIES.

Mr. C. W. POST, of Murray, read a paper on the above subject as follows :

In writing on the above topic, or in locating apiaries, there are many things to be taken into consideration. In localities that are favored with a good average flow of fall honey and other conditions favorable, I think it is more profitable to locate permanently and thus save the time and expense of moving the bees and surplus receptacles. On the other hand you will often find localities that will give a heavy surplus of white clover and basswood honey, but after that is over there is nothing for the bees to do for the balance of the season but rob, plunder and consume the honey they have on hand, and in many cases require to be fed their winter stores. In the latter case it pays to move them to more favorable localities, not entirely for the amount of honey they may gather but so they will go in winter quarters in far better condition. I will give my actual experience during the past season in running two out apiaries in localities as above mentioned. In one place I have an apiary permanently located ten miles east in Prince Edward county, while the other I moved out and returned home in a car load lot. My house apiary is located on the shore of Weller's Bay on the narrow isthmus that joins Prince Edward county to the mainland, now made an island by the construction of the Murray canal and but a few rods from Weller's Bay station on the Central Ontario railway. This locality is an excellent one for buckwheat and golden rod honey, but not so good for white honey. So I decided to try the experiment of running a carload of bees north on the line of the C.O.R. for the white clover and basswood crop, and return them home in time for buckwheat and golden rod. During the latter part of last winter I made arrangements with the Superintendent of the Central Ontario railway to run a carload of bees north to any point that I wished to locate south of Marmora station. I went to work, and during the winter and early spring got everything ready to carry out the experiment. On the 12th June I took a trip north over the road to select a locality, and settled on one at the Midland Railway Junction and on the premises of B. O. Lott, Esq., of Anson, P.O. I commenced to prepare the bees for moving on the 16th of June as follows: I use the Langstroth hive with hinges to bottoms. I have 2½ in. hole in the centre of bottom boards and 1¼ in. hole in the centre of the back ends; these holes are covered on the inside with wire-cloth, and the outside is covered by a thin slide; each hive is provided with a wire-cloth cover, the whole size of the top of the hive tacked on a frame made of 1 in. stuff. I secured the frames from shifting by tacking wire nails through ends of frames. I then nailed on the wire-cloth covers. On the 19th June I had them all ready to load on the car, in the evening of that day closed up the entrances and loaded up a spring waggon to be ready for an early start next morning. We were up and at it the following morning at sunrise, and had the car loaded at 9 a.m. ready for the ten o'clock train. I loaded the bees in the end of the car next to the engine with the back ends tight against the car, and placed them two tiers deep on the break joint principle with strips between them. My two sons aged 14 and 16 years helped me to load the car, and the youngest went along with me to help to care for the bees on the road. At 10 a.m. we pulled out and started on our journey. I was furnished with a good stock car, and our load consisted of 92 colonies of bees, 184 top stories filled with combs and foundation, honey extractor, wheelbarrow stands in the flat and other things too numerous to mention. The only attention the bees required was to water them, which I did by springling water over them, and for this purpose I used about 10 gallons. We arrived at our destination at 3.30 p.m. Mr. Lott was on hand with a long spring wagon, and we unloaded them and drew them to his place, a distance of ¾ of a mile in two loads, the first load consisting of 56 colonies. The next day I placed them on their stands and fixed them all up, and put on top storey filled with drawn combs, but left off the queen excluders, and they stored honey very fast the same day. I examined them all carefully, and there was not a particle of brood destroyed in moving them. There was brood in all stages, and plenty of eggs in every hive, and I don't think that there was one quart of dead bees in the whole lot. I returned home by train the same evening. The next visit made was the 2nd July, and I found them in good shape. The first set of combs was nearly filled, so I set this first top storey off on a sun cap and put on queen excluders, and set on an empty top storey, and placed four frames in it from the top storey taken off and alternated the combs with full sheets of foundation. When I found any eggs or young larvæ in the combs, I placed them in the second stories. I left them with two top stories on each hive; I then levelled all the hives with a spirit level, and went home. The next week I went through them again and, as I expected to find, the foundation in the lower top stories was well drawn and partly filled with honey, while in the upper set of combs, some of the foundation was not drawn. This time

I changed them over and put the bottom on the top. This, as I had great fears it would do, taxed their patience too much and gave them the swarming fever, but as the queens were all clipped there was no loss of bees, only the necessity of watching them for a few days. As the swarms issued, I gave the queens away for the watching, and in a few days I went through and gave each colony a cell ready to hatch from the best colonies, first destroying every cell in the hive, and not a colony failed in getting a queen. About this time, July 21st, basswood was beginning to blossom, and I extracted the white clover, and took 6,500 lb. The top stories were placed on the hives again, but the basswood was almost a failure here. I extracted again the fore part of August, and got 1,600 lb. of inferior honey. I then prepared them for the home journey. As I extracted them, I selected six of the strongest combs from the top stories of each hive, and left ten frames in the other top and set them away for the season. I then spaced the six frames at equal distances, and secured them by driving 1½-in. wire nails through the ends of the frames, and set a top story on each hive and secured it to the body of hive by two wire nails through the side cleats nailed on the wire cloth covers, closed up the entrance and they were ready to ship. I loaded the car on the 13th of August, and started for home at 4.50 p.m. I arrived home same evening at 9 o'clock and unloaded them and had them on their stands before 5 a.m. next morning ready for the buckwheat, of which there was hundreds of acres in full bloom a short distance from my apiary. Of my other out apiary I will say nothing, except that it was run on the same principle as the one described. There were the same number of colonies. I had two sets of drawn combs for each hive. They gave me a surplus of 5,300 lb. extracted honey. Not a swarm issued last summer, and they are in good condition for winter.

Unfortunately, there was no time at the disposal of the meeting to discuss this paper, as train time was rapidly approaching and necessary business had to be done.

A vote of thanks was passed for the use of the court house to the city authorities and the meeting adjourned.

DIRECTORS' MEETING.

Before separating the new board of directors held a meeting for organisation, etc., the vice-president in the chair.

W. Couse was reappointed secretary and R. McKnight treasurer.

The president, treasurer and secretary were appointed the executive committee.

The president and secretary were appointed the printing committee.

The president was appointed a delegate to attend the Central Farmers' institute annual meeting.

A. W. Humphries was appointed delegate to the Western Fair association.

Messrs. McKnight and Emigh were appointed delegates to the Toronto Industrial.

Mr. McKnight was appointed to arrange for premiums for members for the year.

The president, vice-president and James E. Frith were appointed a committee to consider the danger of the introduction of foul brood into Canada from the importation of bees, and if found desirable, to take such steps as will insure the protection of bee-keepers through quarantining imported bees when deemed necessary.

Two hundred dollars were appropriated for affiliated societies, no society to receive more than $30.

A grant of $25 to the Toronto Industrial towards apiarian prize list was made ; and a grant of $10 to the Western Fair for a similar purpose.

Messrs. Gemmell, Frith and Corneil were appointed a committee on bee-journalism.

Next annual meeting will be held in London 5th, 6th and 7th January, 1892.

The board then adjourned.

THE POULTRY ASSOCIATION OF ONTARIO.

To Honorable JOHN DRYDEN, Minister of Agriculture :

SIR,—The seventeenth annual exhibition of the Poultry Association of Ontario was held in the skating rink, in the town of Bowmanville, January 5th to 9th, 1891. All classes were fairly well represented with the exception of Javas. Some of the pens were magnificent, while all the birds were in first-class trim and showed to advantage.

Bowmanville being east of Toronto resulted in enticing a number of visitors and exhibitors from the eastern part of the province to see the exhibition and purchase stock. The exhibitors were from all parts of Ontario, and combined to show what Canada could do in the breeding of fancy and useful poultry.

Poultry breeding has now become one of our most important industries, but to get the best results, farmers and others must import more birds, adding to their fowls year by year so as to get new blood in their stock, thus gaining in vigor and size, and securing better returns in eggs and flesh. Both these qualities were fully developed in the various breeds at the show. Since the holding of our exhibition many Canadian fanciers have attended some of the most important poultry exhibitions in the United States, in most cases winning on every specimen shown. This fact goes to prove that Canada is not behind her neighbor in the matter of fancy poultry.

The following gentlemen were chosen by the directors to perform the difficult task of judging poultry, viz. : Messrs. Sharp Butterfield of Windsor, T. H. Smelt of Woodstock, and L. G. Jarvis of Port Stanley ; and on pigeons and pet stock, Mr. Ham Cooper of Hamilton. They gave general satisfaction, performing their respective duties well and in less time than at any previous exhibition, as the score cards and prize tickets were on all coops and cages by Thursday noon. The judging was by the New American Standard Perfection, assuming one hundred points as a perfect bird. Mr. Smelt's score card was used, which is a great improvement on the old score card formerly used at our exhibitions. The directors, having profited by the experience of former officers, divided the classes more evenly with the judges, and thus overcame the difficulty of not having all the birds scored before the close of the show. This resulted in getting the score cards up in good time, and gave the visitors an opportunity of studying the anatomy of the bird. It likewise gave the exhibitors a chance to sell their exhibits, and to the buyers an opportunity to study the defects, in order to make a selection as to improvement in their stock. As to quality of exhibits, it was said by the oldest exhibitors that this was one of the largest and finest exhibitions ever held by the Ontario society.

All classes were divided into their respective varieties and exhibited as single birds. Asiatics included Light and Dark Brahmas, Buff Partridge, White and Black Cochins and Langshans. These classes were well filled with magnificent birds, and were reported by the judge to be as grand a lot as he ever saw. Light Brahmas were well represented. Darks were not quite so large in number, but the quality was equally as good, some of them weighing twelve pounds a piece. Brahmas are the largest variety of poultry we have. They lay a medium sized egg, with dark shell, and yolk which is said to be of the best flavor ; they also lay a large number of eggs and are not inveterate setters.

In Cochins all colors were fairly filled with good birds. The Buffs were an extra large class, and as for quality they were the grandest lot of Buff Cochins that were ever in the show pen. The judge had all he could do to award the prizes. Langshans were out in large numbers, there being some thirty-three in the class. This breed has been improving greatly and is becoming more popular with the fanciers in general, as it is to be found in four out of every five breeders' yards in America. The birds mature early, and the pullets lay when five or six months old, and are one of the best winter layers to be found. They are also an excellent table fowl, as they are of plump form and will weigh up well and fatten early. The males make a good cross with the Black Spanish hens, as they are much larger than the Spanish; they are hardier and mature much quicker. This cross makes a good general purpose fowl for the farm, as it has the size and laying qualities combined in one.

Of Dorkings there are three varieties—Silver Grey, Colored and White. There was an average number exhibited, but the quality was extra. They are medium layers and are noted for their square build and flesh-producing qualities, giving an abundance of meat on the breast; they are greatly preferred in England.

Game fowls were well represented, including all colors—Black-red, Brown-red, Golden and Silver Duckwings, Pile and Indian, the latter being new varieties. They are very large, and one cock weighed twelve pounds. They are just what the farmer wants to cross with his common fowls for market purposes, as they mature early.

Plymouth Rocks were large in number and the quality was good, including Barred and White. They are counted one of the best general purpose fowls in existence, and are to be found on nearly all farms throughout Canada. They mature early, are good layers, and are also good table fowls, with yellow skin and shanks, which make them the best variety as to meat for the Canadian markets.

Wyandottes were shown in large numbers, and were of excellent quality, including White, Silver and Golden-Laced. This variety owes its origin to America. They are not bred so extensively as the Plymouth Rocks, but as a general purpose fowl they rank next. They lay about the same number of egg, but not of so large a size. The color of the Silver and Golden are much admired, especially when one sees a large flock of them together on the green lawn of a fancier of the Wyandottes.

Spanish fowls were well represented, being one of the oldest varieties we have in Canada. They are good layers of large white eggs, but being somewhat tender they cannot stand the winter season, and consequently are not extensively bred in Canada. They are one of the most handsome varieties we have when bred to perfection, with their large red combs, white face and black plumage.

Minorcas were out in large numbers and the quality was extra. This variety resembles the Spanish, with the exception of not having the white face. Being hardier they are better adapted to the country. They lay a large white egg, and mature very fast. There are two colors, black and white.

Leghorns were not shown in very large numbers, and the quality was only medium. All colors were represented, the rose combs taking the lead. This is one of our oldest varieties, and ought to be shown more extensively than they are at our winter shows. They mature earlier than any other breed in existence. Pullets lay at four months, and they bear confinement well and lay the largest number of eggs of any breed. They are non-setters, and by crossing with the Brahmas, Cochins or Langshans, they make excellent farmers' fowls.

The Andalusians were out in larger numbers than usual, and the quality was extra. This breed is becoming more popular. They are good layers, and being non-setters are valued for their laying qualities, as they lay a large white egg and bear confinement well.

Houdans were well represented both in quality and numbers. This variety belongs to France. They are good layers and non-setters, and are a fine table fowl, which makes them a favorite variety to breed.

The Polands are considered to be the oldest of our domestic poultry, as well as the handsomest. They were represented by eight varieties. They are non-setters and good layers, and mature early. This class was well represented in number and quality. One pullet scored 98½ points out of a possible 100, this being the highest scoring bird in the show.

Hamburgs were shown in large numbers and of good quality, consisting of Golden-spangled, Silver-spangled, Golden-pencilled, Silver-pencilled and Black. They are very good layers. This breed ranks in size next the Bantams, and being of a wild disposition they are very hard to confine to limited quarters.

Bantams were out in full force, including Black-reds, Brown-reds, Duckwing and Pile game ; also Golden and Silver Sebrights, Black African, Polish, Japanese and Pekins. The Bantams are bred in large numbers for fancy. They are excellent layers and make the very best of mothers for young chicks.

The Turkey class was well filled and the birds were of excellent quality, some of them weighing as much as 40 pounds apiece. Turkeys are chiefly bred by farmers, and large shipments are made annually in the fall to the United States, from which considerable revenue is derived.

In Geese all classes were well filled and were of good quality. The Toulouse (grey), and the Bremen (white), make excellent varieties to cross with the common goose as they are of great size, increasing weight and quantity of feathers.

All varieties of ducks were well represented, including Aylesburys, Pekins, Rouens and Cayugas. The Aylesburys were of large size and of extra quality. The Pekins, which are the best layers of the duck family, were of large size and extra good quality, and are more extensively bred than any other. The Rouens are nearly as large, and are somewhat of a plumper build, but they are not quite as good layers.

All varieties of pigeons were well represented, making the largest exhibit ever held in Canada. Pet stock birds were out in great varieties and of excellent quality.

THE ANNUAL MEETING.

The annual meeting was held on Thursday, January 8th, the third day of the Exhibition, when Bowmanville was selected by a large majority as the place for the next Exhibition, and the following officers and directors were elected :

President.—J. W. Dutton, Bowmanville.
First Vice-President.—Allen Bogue, London.
Second Vice-President.—William Barber, Toronto.
Secretary.—J. M. Hern, Bowmanville
Treasurer.—J. J. Mason, Bowmanville.
Directors.—J. B. Archibald, Bowmanville ; W. R. Knight, Bowmanville ; John S. Moorcraft, Bowmanville ; Wm. McNeil, London ; George S. Oldseive, Kingston ; John Cole, Hamilton ; D. C. Trew, Lindsay ; James Main, Boyne, and C. F. Wagner, Toronto.
Auditors.—Thomas A. Duff and H. B. Donovan, Toronto.
Delegates to Industrial Exhibition.—Joseph Dilworth and C. F. Wagner, Toronto.
Delegates to Western Fair.—George G. McCormick and Jno. H. Saunders, London.
Delegates to Central Fair.—John Cole and P. H. Hamilton, Hamilton.

The next meeting will be held in Toronto during the Industrial Exhibition, for the purpose of revising the premium list and the appointing of judges for the next Exhibition.

J. M. HERN,
Secretary.

FARM POULTRY.

By W. B. TEGETMEIER, IN THE JOURNAL OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.*

Forty years ago the Royal Agricultural Society offered a prize for the best essay on the rearing and management of farm poultry. This was awarded to Mr. William Trotter, of Healey Mill, Hexham, for a very practical and useful article on the subject. Since the date of its publication a great impetus has been given to poultry keeping by the establishment of competitive shows for fancy varieties. At these shows, however, useful properties have been almost entirely ignored, and prizes have been awarded for accuracy of marking in feather, symmetry of comb and other fancy points having no reference whatever to the value of fowls as market or table poultry, or as egg-producers. In fact, it is hardly too strong an assertion to maintain that every breed which has become a fancy or show variety has been deteriorated in practical value. The produce of eggs in particular has been utterly neglected, and many of the breeds which, before the era of poultry shows, were valued as large egg-producers, are now almost useless in that particular.

Half a century since, Spanish fowls were commonly seen in many of the large stable and farmyards about London, being kept solely for their abundant production of large white eggs. They are now known as the worst layers of any non-incubating variety, and some of the hens that have figured largely as prize-winners have never laid an egg. Amongst the incubating breeds Cochins were at one time regarded as the most prolific layers, being absolutely credited by some with the faculty of laying two or even three eggs per day. For the last forty years they have been bred solely for feather, and the result is that this breed, once possessed of certain useful properties, is now valueless except as a fancy fowl. Its introduction into our poultry yards has in fact done more harm than good to our native breeds, inasmuch as, while it has lost its own prolificacy, its deficiency of flesh upon the breast has tended considerably to depreciate the value of our table poultry with which it had been crossed.

Since the introduction of fancy poultry the importation of eggs, more especially from France, has gone on increasing to an enormous extent, a fact which some persons seek to account for by the supposition of the existence of large and extensive poultry farms in France. This belief is so thoroughly grounded in the mind of the public, that scarcely a year passes but poultry farms are started. These generally last about a couple of seasons, at the end of which time the capital of the founders is exhausted, and all the plant and what remains of the stock is distributed by the hammer of the auctioneer.

Poultry farms have been tried in England under every variety of condition. Large portions of land have been devoted to their service, and have in some cases been gratuitously given for the purpose. In others extensive ranges of buildings have been erected according to various plans, but in every instance the result has been the same—disastrous pecuniary failure. Numerous accounts of suppositious poultry farms in France have appeared in English journals; but they have had no existence except in imagination. Mr. Charles L. Sutherland, one of the assistant commissioners of the Royal Commission on Agriculture, devoted special attention to the subject in 1879 in the course of his investigation into the agricultural condition of West Central France, and he thus describes the result of his enquiries :

"It is a commonly received idea in England that there exist in France huge poultry farms where fowls are kept by several hundreds, and it has been over and over again urged on English farmers to adopt this poultry farming on a gigantic scale as some sort of means of alleviating the present depression and enabling them to make money. A long acquaintance with the chief French poultry-breeding district as well as answers to enquiries I have from time to time made on the subject, enable me positively to deny the existence of such establishments. The greatest number of heads of poultry that can be kept profitably on a single farm varies from two to three hundred. If a greater number than this is kept the ground becomes poisoned, and it is found impossible to rear chickens. Whenever large poultry farms have been started in England, as for instance at Bromley in Kent, they have failed and chiefly owing to the above reason, a reason perfectly well-known to and understood by all practical poultry keepers. The manner in which so many fowls are reared and eggs produced in France is as follows, independently of course of climatic influences which must be held to be of some little account. Every peasant proprietor, every *bordier*, with perhaps two or three acres of land keeps fowls the produce from which is collected by dealers who scour the country. In this way a large number of fowls in the aggregate is kept, but they are scattered about all over the country; and so well is the necessity for change of ground understood in the districts where poultry rearing is a special industry, that great sacrifices are made by the breeders to secure fresh ground on which to rear their chickens."

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* Journal of the Royal Agricultural Society for March 1891, pp. 67-82.

There can be no doubt that poultry would be much more extensively and profitably reared by the small farmers and cottagers in our own country than is now the case, and far better table fowl could be produced. The great drawbacks to the profitable keeping of poultry are identical with those alluded to by Mr. Whitehead in his valuable "Hints on Vegetable and Fruit Farming," issued by the Royal Agricultural Society. These he states to be "the excessively high rates charged by the railway companies for the carriage of produce, and the unsatisfactory modes of distribution. In the existing circumstances the producers get the minimum value, while the consumers have to pay the maximum price. The pernicious system of salesmen and middlemen, and the routine of markets hinder enterprise and check production." If poultry were consigned to the markets the producer has no check whatever on the middleman, and whatever the price to the consumer may be, he gets a very inadequate return. But in spite of these drawbacks it is believed that the cultivation of poultry may be largely and profitably extended, if it be conducted in accordance with profitable rather than fancy considerations.

Fowls.

The first point to be considered in the keeping of poultry is the accommodation that can be afforded them. The practice of allowing fowl to roost in the trees, though very conducive to their health and high condition, is one that is obviously rarely practicable; but with regard to a house no particular form or character is necessary. Stalls of an unused stable or any ordinary shed can with little or no expense be converted into a poultry house as advantageous as the most expensive. The arrangements in ordinary houses are eminently unsatisfactory. Usually perches are made one higher than the other, the topmost being near the roof; the result is a two-fold injury. Fowls retain their original instinct of roosting high up in trees, remote from their enemies. Consequently all ascend to the highest perch, fight for places, knock one another down and, as they fall perpendicularly, injure and frequently break the keel of the breast-bone. When descending from the trees in the open, the fowl has the power of flying a long distance and comes to the ground gradually. When dropping from a high perch in a confined building it comes with a violence to the ground, strikes the feet against the floor, which in heavy birds induces "bumble feet" and is also apt to break the breast-bone.

These evils may be avoided by putting all the perches on one level, about three or four feet from the ground, when there will be no quarrelling for places and the fowls can be caught when required with much greater facility. In this case there must be no access to high rafters or cross beams up to which fowls can fly. The nest-boxes which are to be seen in the country poultry houses are usually placed on rows or shelves which are sometimes in tiers, one above the other. No arrangement can be imagined better calculated to insure the injurious dryness of the eggs, and to favor the generation of vermin which infest the sitting hens and nests.

The nests, in accordance with nature, should be on the damp ground so that the eggs may be cooler below than above. A bushel of mould or a thick green turf kept in its place by two or three bricks makes the most efficient and healthy nest. They may also be made in boxes or in old market baskets filled with moist earth. These can be covered over with an ordinary circular coop so that the sitting hen is not molested by the others. If a hen lays away stealing a nest in a hedge or under a corn stack, or any other obscure situation, the eggs should never be touched if chickens are desired; as soon as the hen has laid her full clutch she will sit, and bring out a far stronger and healthier brood than will be produced under any more artifical circumstances. The exposure of the eggs to the weather does not, as many people imagine, injure them in the slightest degree, for when a hen sits under these circumstances she usually hatches every egg.

If only one place can be devoted to both the hatching and laying fowls, it is necessary to divide the former from the latter by a piece of wire-work, for if the laying hens are allowed to intrude upon those that are hatching, fighting—tending to a great destruction of eggs—ensues. Where it is practicable, it is always exceedingly desirable to set two or three hens on the same day. When they have sat a week the eggs should be tested and those which are not fertile removed. Many instruments under various names have been devised for this object, but none of them are superior to a piece of stiff cardboard, as the cover of a book, having an oval hole cut in it slightly smaller than the egg to be examined. This is readily used with an ordinary lamp at night. The eggs should be carefully removed from under one of the hens taken to a dark room then examined. The cardboard is held upright between the eye and the light, and the egg is placed against the hole. If the light shines through it and it is clear, having the same appearance as a new-laid egg, it is not fertile, and it is worse than useless to replace it under the hen, as it occupies space and is liable to be broken and soil the other eggs. Those eggs that are fertile and contain chickens are perfectly dark and opaque, except at the larger end where the air space is to be seen.

When two or three hens are set upon the same day and the eggs are examined at the end of the week, the clear ones being removed, it frequently happens that a sufficient number are taken away to enable the eggs of two hens to be given to one, or the eggs of three hens to be given to two, when a fresh sitting can be given to the hen that has been deprived of her batch. The eggs should hatch at the expiration of three weeks, viz.: on the 21st day. The less interference that takes place at this time the better. Occasionally the life of a weakly chicken unable to get out of the shell may be saved by assisting it, but there is no doubt that more chickens are destroyed by interfering with the sitting hen on the twenty-first day than are saved by any assistance rendered. The hens should be left in the nest until the next day when the young chickens will be strong, dry and active. The hen should then be put under a coop with her brood; if possible in a sunny place, as under a south wall.

The first food for the chicken should be egg and milk (the clear eggs removed from the hens answer admirably for this purpose). Each egg should be beaten with a couple of tea spoonfuls of milk, and set into a custard-like mass by the side of the fire or in the oven. This should not be given to the chickens until the hen has been abundantly fed with corn and has satisfied her own hunger. For other food I much prefer to use a little canary-seed or Egyptian dari to crushed grits, which are apt to become rancid from the external covering having been removed. Bread and milk can also begiven to the chicks, and sweet meal and milk; but much loss in rearing chickens occurs by the use of old meal which has been exposed to the air after grinding, and has become pungent and acrid.

The practice of cooping hens and chicken, though in many cases indispensably necessary, cannot but be regarded as an evil. The hens have no power to scratch for worms and grubs which form the natural and by far the most advantageous food for the young. The chicks again are fed day after day in the same place, and constantly pick up food contaminated by their own dung, a practice which is certain to induce disease.

It is often alleged that hens allowed at large with young broods wander so much as to "drag them to death." This, however, is only the case when the hen is not well fed, and she has to seek for food for herself as well as worms for her chicks. In health and vigor no chicken can compete with those that are produced by a hen who steals a nest under a hedge, and brings out a clutch of strong and robust chickens, with which she returns to the homestead when they are two or three days old. If chickens must be confined, it is much better to put each coop into a temporary run made by unrolling a coil of wire-work, which can be shifted each day on to the fresh ground, a proceeding of very great advantage. Under these conditions the chickens are out in the early morning sun, instead of being shut up in the close air of a fowl-coop for some hours after they are awake, as is usually the case when the hen is confined.

The practice of tethering hens by one leg, which is frequently adopted by gamekeepers who rear pheasants, is one that may advantageously be introduced into poultry keeping. At the present time the custom is largely followed of giving chickens artificial food, which is often of very highly spiced and stimulating character. In my opinion no practice can be more objectional. No dried animal food can equal the natural diet obtained by the hen for her chicks if she is allowed liberty, and high spiced substances are neither natural nor desirable as food for chickens. The utilisation of the waste house-scraps is most valuable. Bread soaked in milk, potatoes from the table, etc., and very small quantities of meat may be given. Care should be taken not to give fowls at any age too much animal fat ; this is specially important as regards laying hens.

The temporary runs that I have recommended can be placed anywhere about the farm buildings, or still more advantageously in a garden where the young chickens can wander at will, and find much wholesome food without doing any damage. An orchard is also an exceedingly useful place for coops or runs, as well as for the older fowls. The advantage of placing fowls in an orchard is twofold. They destroy large numbers of injurious insects, and at the same time fertilise the ground with their droppings. If an orchard is divided into two parts, one of which is used for fowl keeping and the other not, it will be found that the former is much more productive than the latter, the circumstances being equal. The late Mr. Mechi, of Tiptree Hall, used to allow his fowls to roam freely in his cornfields, and he always maintained that they did so with great advantage to themselves and with no injury to the corn.

In determining the most profitable breeds for a small farmer or cottage proprietor, we have first of all to consider whether eggs or market poultry are the most important consideration. In some places eggs may pay much better than table fowls, and in others the reverse. If eggs are wanted, a non-incubating breed should be kept, as these lay a much larger number of eggs than hens that habitually sit. Formerly Spanish were largely used for this purpose, but their value, as before stated, has been utterly destroyed by their being solely cultivated as white-faced fancy fowls. The common black Mediterranean breed, known as Minorcas, are amongst the very best layers at the present time, provided that ordinary farmyard specimens and not show breeds, bred solely for size and regularity of comb, are selected. Leghorns, or a somewhat similar breed, have been, since their first introduction from America by myself, in 1868, so closely interbred and shown as fancy fowls, that their size and vigor have much deteriorated. Their general color is white, but recently they have been crossed with game fowls, to produce what are called Brown and Pile Leghorns, by which their vigor has been considerably increased. Andalusians, birds of the Spanish style, are also good layers, but they are now bred more exclusively for fancy markings than for profitable considerations. Spangled Hamburghs, or so-called pheasant fowls of the North of England, were formerly most profitable layers, but they also have been so exclusively bred for feather, that their valuable properties have been greatly lessened.

On the whole I should be inclined to recommend ordinary farmyard black Minorcas as the best breed that a small farmer can have, if the production of large white eggs is desired. I am sure, however, that no breed of fowls in existence will produce on the average, anything like the number of eggs which is sometimes stated as a common result. If a farmer can obtain an average of one hundred and fifty eggs per annum from his stock, he may consider himself to have done very well. In many localities, as near towns and other populous places, it will be found desirable to use every effort to obtain new-laid eggs in the early part of the year, when they often fetch very high prices. For this purpose reliance must be placed on early hatched chickens, as the May broods do not lay freely in the cold weather.

When birds are required for market or the table, Mediterranean birds, such as Andalusians, Minorcas, and Leghorns are of very small value, not carrying much meat on the breast or being capable of furnishing plump and saleable chickens. For table poultry, Dorkings have a very great reputation, but the markets of London are chiefly supplied with what are known as Surrey fowls, which have been derived from the old-fashioned Dorkings that existed before the time of competitive shows. The modern show Dorking derived its greatly increased size from being crossed with the Malay breed, and what it gained in size it lost in quality and plumpness. It has also the disadvantage of being delicate. These defects may be removed by judicious crossing, and there is no doubt that the best table fowls at present produced in this country are those resulting from crossing the Dorking either with the old-fashioned English game or the Indian game. By these means a hardy, early matured, very plump breed is produced, and at the shows of dead poultry these birds have always proved superior to others put into competition with them. I have never, under any circumstances, not even in the shows of fattened dead poultry that take place in Paris, seen better specimens of large plump table fowls of the highest quality than those that were exhibited as the result of this crossing at the last dairy show held at the Agricultural Hall.

The Azeel, or Indian fighting cock, is an extraordinarily plump, close-feathered and heavy bird, and also crosses excellently with the Dorking and Surrey fowl; but it has two disadvantages—it is rather small, and of such exceedingly combative propensity that it is difficult to manage. Moreover, the hens are very indifferent layers, usually wanting to sit after laying ten or a dozen eggs. The crosses between the Indian game or the old-fashioned English game and Surrey or farmyard fowls are, on the other hand, as good layers as any variety of fowl that habitually sit. There is a preference in this country for table fowls with white legs; although a most absurd one, it must not be ommitted from consideration when breeding for the table, as to some extent at least it affects the price of market chickens.

I have not thought it necessary to mention particularly other crosses and other breeds of poultry as market fowl. Many farmers have sought to increase the size and value of their fowls by crossing with some of the Asiatic varieties, such as Cochins, Brahmas, Langshans, etc. It is quite true that size can be gained in this manner, but as the cross-bred birds are deficient in the amount of flesh on the breast, and carry a great deal of offal in the shape of heavy, coarse bones and useless feathers, the proceeding is not desirable. Crosses of this kind have found no favor in the eyes of our more practical neighbors, the French, nor are the birds appreciated by the feeders, who buy for the purpose of fattening for the market. There has been a run recently on a cross-bred breed, manufactured some few years since in America, and known as Plymouth Rocks. These being hardy fowls, and for sitters abundant layers, they met with considerable favor in this country, especially as their well-marked plumage allowed them to be exhibited as fancy fowl. Their yellow skin and want of quality and plumpness render them, however, not adapted for market fowl in England. In America, where a good roast fowl is a rarity, chickens are mostly used as "broilers" when young, being split down the back and cooked on a gridiron, when the bright yellow skin of the Plymouth Rock is not objectionable. At present the fashion in fancy poultry has tended in favor of a handsomely feathered breed termed Wyandottes, and the Plymouth Rocks are going out of fashion. As Wyandottes have been reared exclusively for feather making, they are, as might be expected, destitute of any merit as market fowls.

It may be asked what course should be recommended to a small farmer who has a stock of fowls and wishes to improve them, with the view of producing good birds for the table. In many cases it would not be desirable to dispose of present stock and buy an entirely new one. The plan would be expensive, to commence with, and there might be a difficulty at the present time in getting really good birds for useful purposes. Birds that are now advertised and sold are in nine cases out of ten fancy birds, and have not been bred with any idea of their economical value. I should be disposed to recommend a small proprietor to look carefully over his stock; to get rid of all the small, weakly, undersized birds; to allow no pet fowls to remain, only those that are really the best of the stock; and then, getting rid of all the male birds, to place in his yard a good close-feathered, short-legged Dorking or Surrey cock. At the end of the year this bird should be at once got rid of—killed and eaten, if he cannot be sold. The following year the best of the large pullets only should be allowed to remain. The cross-bred cockerels having been disposed of, a good heavy, short-legged Indian or old-fashioned English game should be obtained as the stock bird for the season. Each year in succession a new stock bird should be got, either Dorking, English or Indian game. For it is the constant inter-breeding which takes place in most farmyards that leads to the great deterioration of the size, condition and constitution of the poultry.

As none of the half-bred cocks are to be kept, it is desirable to sell them as early as possible. They realise more money when young, and should be prepared for the table and market at once. The best mode of doing this, although it is not always in the power of the small farmer, is to take the cockerels away before they attain maturity, as soon as the combs begin to shoot and before the curved tail feathers can be seen. If they can be placed together in a run far removed from any hens, they will grow into large size without losing quality as table fowl; whereas, if they are allowed to run with the other fowls, they are continually chasing them and quarrelling among themselves. They cease to gain in weight and lose very much in condition, the flesh becoming hard. But this separation of the sexes in chickens intended for the table is only practicable in farms of some considerable size. In every case it will be found desirable to sell off the cockerels, and those pullets that it is not desired to keep for stock, at an early period in their lives, or else to put them to fatten in the ordinary manner. If fattened in coops, the cockerels should be shut up as soon as the central tail feathers are noticed as curving over the others, and they should be fed upon meal and milk until they have obtained the desired fatness.

Fowls cannot, however, be fattened without care and attention. They should be shut up in coops raised from the ground on legs, the bottom bars being about an inch and a half apart, so as to ensure cleanliness. Not more than a dozen fowls at a time should be put up together in one coop. In front a wedge-shaped trough should be placed. This should be filled three times a day with coarse, fresh oatmeal mixed with milk. No more should be given at once than will be eaten up at the time, before a fresh meal is given. The troughs should be kept thoroughly clean. It is best to have two sets so that each can be scalded with boiling water every other day after use. At one end of the coop water should be given, and on the ledge supporting the trough a small supply of fresh clean gravel; a green turf may occasionally be put in the coop.

It is necessary to give these fatted fowls their first meal in the morning, at sunrise. If this meal is delayed until about eight o'clock the fowls have been hungry and restless for hours, during which time the fat of the previous day has been wasted in useless exercise. About a fortnight is generally sufficient to fatten fowls if these precautions are attended to. If the fowls are wanted fatter they may be kept up a week longer, during which time they may be given a little hard mutton fat, such as the parings of the loin, which may be put in the scalding milk with which the oatmeal is mixed.

If fowls are wanted exceedingly fat they must be crammed. On a large scale this is done by the aid of a cramming machine, of which Hearson's is the best that I have seen, but a small number may be crammed by hand, selecting those that have been put up to fat for a fortnight. In cramming, the oatmeal is mixed with boiling milk (to which a little mutton fat may be added if thought desirable), sufficiently stiff to be rolled into sausage-shaped masses about two inches long and the size of the finger. Each fowl is taken out in succession, held in the lap, the beak kept open with the thumb and finger of the left hand; the sausage-shaped mass of meal should be dipped into milk and placed at the back of the throat and pushed down with the finger, the head being extended. About six or eight of these crams are given two or three times a day to each fowl, care being taken to ascertain that the previous meal has entirely passed out of the crop before another is given. Should it not have done so the beak should be opened and some warm milk poured down the throat. The fowls thus fattened are usually spoken of in the London market as Surry capons, but the term is incorrect, as very few of them have been operated on, nor is the operation necessary. If the fowls are killed as hereinafter described, after sixteen hours' abstinence from food, it is not desirable to draw them before sending them to market, as they keep much better when not drawn, and consequently realise higher prices.

No fowl should be killed before it has fasted fourteen or sixteen hours. Those birds that it is intended to kill early in the morning should have both food and water taken away not later than four or five o'clock the afternoon before. If this is not done and they are killed full of food, it soon decomposes, turns the birds green, and renders them comparatively worthless. Even if the food has passed out of the crop and into the bowels, the fowls will not keep long, as the half-digested food in the interior causes them to spoil and gives them an exceedingly unpleasant flavor.

With regard to the mode of killing fowls intended for sale, the most universal practice in England is to break their necks. This should be done by seizing the legs of the fowl in the left hand and the head in the right, the back of the bird being upwards and the comb in the hollow of the hand. If the legs of the bird are then held against the left hip and the head against the right thigh near the knee, by strongly extending the fowl, and at the same time bending the head suddenly backwards, the latter is dislocated from the top of the neck, and death results instantaneously, all the large vessels being torn across and the blood escaping into the skin of the neck. Muscular contractions, however, remain for some minutes, during which time the fowl, if put down, knocks itself about, bruising the flesh; it should therefore be held in the hand or hung up by a string round the legs to a hook in the ceiling. The fowl having been killed should be plucked whilst warm; in fact the professional killers proceed to remove the feathers immediately after dislocating the neck, as then they come out very easily and the skin does not tear. There is no cruelty in doing this, even if it be before the muscular contractions have ceased, as the head of the fowl is removed from the body, being connected only by the skin, and all sensation is at an end. When carefully plucked the fowls should be placed on their backs, the hocks being tied together, the wings twisted behind the back, and the neck allowed to hang down so that the fluid blood accumulates in it. Under no circumstances should the breast-bone be broken, as it deteriorates very much the value of the fowl. It is needless to say that the legs and feet, if they are soiled, should be washed before the birds are sent to market.

The question may be asked whether it is most profitable to sell fowls from the yard or after being fattened. It depends entirely upon the mode in which they are kept and the local character of the demand. If fowls are well fed in the runs, more especially when the young cocks are kept separate from the hens, they are in the finest possible condition for the table, and the expense and trouble of cooping and fattening are saved; but if they are not highly fed, and if both sexes are allowed to run together, the flesh of the birds soon becomes hard and the quality inferior. Another precaution should be taken: it is the custom of many persons to use maize for the feeding of poultry. This contains a very large percentage of yellow oil, and when given to fowls in quantity it accumulates under the skin, rendering them of a yellow color, and consequently less saleable than they otherwise would be. There can be no doubt that the best food for making the flesh of fowls white and firm is that used in France, namely, buckwheat meal with milk; but it is hardly obtainable in this country, at least at a cost that would prove remunerative, and consequently either barley or oatmeal is usually employed. The latter, having a much higher percentage of fatty matter, is by far the more valuable. Great care should be taken that the meal used for fattening fowls has been freshly ground and is free from any pungent or acrid flavor. It should be mixed with milk in place of water. If skimmed milk is used the fatty matter which has been removed in the cream may be replaced advantageously by boiling up with the milk some hard mutton fat, such as trimmings of the loins.

Turkeys.

Turkeys, though exceedingly profitable, are not reared to as great an extent in this country as in France. The best breed to employ is the Cambridge crossed with the recently imported American, the crossing giving increased size and stamina. The hens when laying are very apt to conceal their nests, in which case they may be allowed to hatch their own eggs or the latter may be removed and placed under large fowls. The eggs should be tested like those of the fowls, on the eighth or tenth day, and only the fertile ones replaced in the nest. The chickens make their appearance on the twenty-eighth day. The young are rather delicate and should not be interfered with until the following day as they require no feeding for the first twenty-four or thirty hours. During this time, as is the case with fowls, the young bird is digesting the yolk which is drawn into the body at the period of hatching and furnishes the first food.

Great care should be taken at first to place the turkeys in a dry situation, such as the foot of a wall facing the south, or under an open shed. The first food of the young turkeys should be egg and milk, prepared as for fowls, but it should be remembered that turkeys are much more addicted to feeding on green vegetables than fowls are. If allowed to wander at will it will be noticed that they eat bitter herbs, such as dandelion and milky lettuces, and care little for whole corn. If ants' eggs can be obtained, such as are used by the gamekeepers for rearing pheasants, they will be found a most valuable addition to the food of young turkeys. But great dependence must be placed in the first instance on egg and milk, fresh meal and milk, lettuces run to seed, chopped dandelion and such insect food as the birds can obtain for themselves In wet weather, when the rain necessitates keeping them under cover, they should never be kept on hard ground, but the floor should be covered with dry soil or ashes. If the hens are cooped the coops should be moved every day, the grass around them for some considerable distance being mown, as is done in the case of pheasant rearing.

Turkeys are particularly subject to cold in the head, causing swollen faces and sore eyes, which rapidly develops into roup, a most infectious and troublesome disease. Care must be taken therefore not to allow hens to wander with the young birds early in the morning before the sun has dried the grass. Although delicate when young, turkeys are particularly hardy when old, and may be allowed to roost in the trees where they do much better than in houses. For the market it is not necessary to shut them up, but they may be fed on soft food mixed with skim milk two or three times a day. In France flocks of young turkeys are frequently put under the care of a girl, who drives them with a long pole on to the stubbles, where they feed on the corn which would otherwise be wasted. This method of using the waste corn which is always knocked out in harvesting is very much neglected in England, although some farmers, by having movable poultry houses on wheels, endeavor to carry it out. The rearing of turkeys is hardly to be recommended in damp localities, more especially where the soil is heavy and clayey ; but in suitable situations, where sufficient amount of attention can be given to the birds during the first few weeks of their lives, there is no form of poultry that pays better as they always, about Christmas time or often before, realise very high prices in the market, and can usually be sold privately, when the profit does not go into the hands of the middlemen.

Ducks.

The usual mode in which ducks are kept in a farmyard is the reverse of advantageous. The plan followed should be that adopted in the neighborhood of Aylesbury and in the surrounding villages, where many tons of ducklings are reared annually and sent to the London markets, realising a most remunerative price. It is said that nearly £40,000 per annum is paid to the neighborhood for early ducklings. The breed chosen there is the white Aylesbury. The ducks are allowed on the water during the daytime, but kept under cover at night. To feed them well the best plan is to put the food, which is generally oats, into a pan of water. If highly fed they will lay as early as December, and the eggs are particularly valuable for producing early ducklings. They are hatched under hens on nests made in the usual manner on the ground with soft, short straw which is much better than hay. The nest should not be allowed to become dry. If it does the eggs may be sprinkled with lukewarm water daily. No interference with the newly hatched brood should take place until the following day. At Aylesbury the ducklings which are reared for the market are not allowed to go into the water. After a few days three or four broods are given to one hen, and they are kept in small compartments in the rooms of the cottages of the rearers or in the sheds, each lot being separated by boards. The compartments are littered down with soft straw and kept particularly clean.

Unlike fowls, the young ducks require a very considerable proportion of animal food. Their first food should be hard boiled eggs, mixed with boiled rice and bullock's liver cut up into small pieces. This is given to them several times a day. After about a fortnight they are furnished with meal which is mixed with scalded chandler's greaves and they also have a due supply of oats placed in water. Fed in this manner they rapidly attain a very considerable size, and at the age of ten or twelve weeks are fat enough for market. These early ducklings command a very high price. In the first of the London season nine or ten shillings a couple, or even more, is frequently given for them. At the age of about twelve weeks they begin to moult and then the nourishment that they receive goes to the formation of new feathers and they do not increase in weight for another eight or ten weeks. Hence there is no advantage in allowing them to remain over twelve weeks before killing them. The secret of success is to feed the young ones as rapidly as possible and get them into the market at the earliest possible period. Those ducks that are intended for stock and not for killing, may be allowed to go into the water after some three or four weeks, but permitting them to swim when growing does not tend to increase their size.

The Aylesbury are by far the most profitable breed for market purposes, they are good layers and heavy birds. The Pekin breed, which has been introduced from China within the last few years, does not weigh as much as the Aylesbury nor is it as advantageous for market. The ordinary colored breeds of ducks are not so desirable, as the dark color of the down, which is difficult to remove entirely before sending them to market, renders them less attractive in appearance when killed. In purchasing Aylesbury ducks for stock the greatest care should be taken not to procure overfatted specimens in which the belly trails on the ground. These are never fertile, both drakes and ducks being absolutely useless.

GEESE.

Geese will be found to be advantageous only under certain conditions. Where there is an opportunity for their grazing without expense in the short grass of commons they can always be kept to advantage. The large size exhibition geese are not to be recommended for farm purposes as they are by no means good layers and frequently are absolutely sterile. For the market the ordinary saddle-backed grey and white geese, if selected of good size and quality, are as good as can be employed. Geese as well as ducks should have a house to themselves, removed from the ordinary poultry. An unused pigsty makes an excellent goose pen. The nest should be made in the corner with mould covered with straw and large enough for the goose to sit comfortably without risk of crushing the eggs. The young are hatched after thirty days and may be fed at first with meal and milk. A little custard is also advantageous, and so are chopped lettuces and fine grass. The young at first need not be allowed to go to the water as a large milk-pan half full of pebbles and water is all that they require. After about a week no further care is necessary for them except giving them food. The most advantageous way to do this is to put the grain in a trough of water.

In the previous I have not alluded to the employment of incubators, which are now used to a very considerable extent by those who hatch large numbers of fowls. Whether incubators can be employed advantageously by the small farmer, depends altogether on the number of chickens he contemplates rearing. I do not think an incubator of less size than one containing fifty eggs is at all desirable, as the external surface in proportion to the bulk renders it less easy to keep up a regular temperature, and a small number of eggs can be as easily hatched under hens. The most successful incubator is that manufactured by Hearson, in which the supply of heat is instantly shut off when it exceeds or even reaches the desired temperature which can be regulated to any required degree. I have tested this incubator for some years, and find that it hatches as large a proportion of eggs as the best hens. The eggs are placed in circumstances in which the natural conditions of hatching are most carefully reproduced. Moisture rises from below, the heat is given above and the natural temperature cannot possible be exceeded, however great the excess of heat from the lamp or gas employed in the machine. Incubators in which the heat depends on the supply of hot water once or twice a day are always altering their temperature, and are consequently unsuccessful. Others, in which the eggs are exposed to the fumes of hot air rising from the combustion of a lamp, are even less to be relied upon as the eggs do not hatch well, unless the air in which they are contained is particularly pure.

The impurity of the air is one of the chief causes why the eggs in an overcrowded or dirty fowl-house never hatch as well as those that are sat upon by the hens out in the open air, as under a hedge or any other concealed situation. An incubator, therefore, should never be placed in a close confined room, but in some compartment or shed where the atmosphere is particularly pure. The chicken breathes through the pores of the shell for many days before it escapes from the egg, and is particularly susceptible to foul effects in an impure atmosphere in the early stages of existence.

Whether or not an incubator can be used depends entirely on the requirements of the farmer, but should it be determined to employ one, it is most desirable that an efficient instrument should be selected, as the use of cheaply constructed machines will only end in disappointment.

IX

SECRETARIES OF SOCIETIES.

SECRETARIES OF SOCIETIES.

LIST OF SECRETARIES OF THE AGRICULTURAL, HORTICULTURAL AND OTHER SOCIETIES OF ONTARIO ORGANISED UNDER THE AGRICULTURE AND ARTS ACT. TOGETHER WITH SECRETARIES OF FARMERS' INSTITUTES.

1891.

Electoral District Societies are arranged alphabetically and printed in small capitals, followed by their respective Township and Horticultural Societies.

Societies.	Secretaries.	Post Office Address.
ADDINGTON	J. B. Aylesworth	Newburgh.
Camden	J. B. Aylesworth	Newburgh.
Loughborough	K. Creighton	Sydenham.
Oso	H. W. Hunt	Sharbot Lake.
Portland	Wm. Thompson	Harrowsmith.
ALGOMA EAST.	Wm. Brown	Sault Ste. Marie.
Billings	T. G. Thompson	Kagawong.
Bruce Mines		
Campbell and Providence Bay	Robert F. Ogle	Providence Bay.
Carnarvon	Charles P. Ferguson	Mindemoya.
Gordon		
Howland	John Dawson	Little Current.
St. Joseph's Island	Chas. Young	Richard's Landing
Sandfield		
Thessalon	Fred Leighfield	Thessalon.
ALGOMA WEST	W. J. Inglis	Port Arthur.
Oliver	Owen Duross	Murillo.
BRANT N.	James O'Neail	Paris.
Onondaga	A. E. Harris	Middleport.
BRANT S.	R. M. Wilson	Brantford.
Burford	Albert Foster.	Burford.
*Six Nation Indians (Tuscarora)		
Brantford Horticultural Society	Thomas Wade	Brantford.
BROCKVILLE	Bethuel Loverin	Athens, Box 214.
BRUCE C.	S. Ballachey	Paisley.
Elderslie	John Claxton	Paisley.
Greenock	J. B. Campbell	Pinkerton.
Huron	Thomas Wilson	Kincardine.
Kincardine	Leonard Shewfelt	Armow.
Chesley Horticultural Society	A. W. Robb	Chesley.
BRUCE N.	R. B. Fleming	Aberdour.
Amabel and Albemarle	D. G. Miller	Wiarton.
Arran	William Whitlock	Tara.
Bruce	Amos Hilker	Underwood.
Saugeen	N. E. Leeder	Port Elgin.
Port Elgin Horticultural Society	W. Cameron	Port Elgin.
Tara Horticultural Society	W. R. Hilborn	Tara.
Tiverton Horticultural Society	A. G. Montgomery	Tiverton.
BRUCE S.	Jacob Seegmiller	Walkerton.
Brant	Abram Rowand	Walkerton.
Carrick	Aaron Moyer	Mildmay.
Kinloss	W. H. Smith	Lucknow.
Walkerton Horticultural Society	Jacob Seegmiller	Walkerton.
CARDWELL	George Everall	Beeton.
Adjala		
Albion and Bolton village	Samuel A. Walford	Albion.
Caledon	W. Rutledge	Caledon.
Tecumseth	George Everall	Beeton.
CARLETON	Adam Abbott	Hazledean.
Fitzroy	Matthew Riddell	Mohr's Corners.
Gower N. and Marlborough	John Wright	North Gower.
Huntley	William Barton	Carp.
March	W. O. Riddle	South March.
CORNWALL	R. Anderson	Cornwall Centre.
DUFFERIN	Thomas Parsons	Orangeville.
Melancthon	R. L. Mortimer	Horning's Mills.

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* Not connected with the Electoral District Society.

SECRETARIES OF SOCIETIES.

Societies.	Secretaries.	Post Office Address.
DUNDAS	George Dillen, sr.	Morrisburg.
Matilda	G. D. Dixon	Dixon's Corners.
Williamsburg	James Dickey	North Williamsburg.
Winchester	Alexander Ross	West Winchester.
DURHAM E.	John Foott	Port Hope.
Cavan	R. H. Hunter	Millbrook.
Hope	R. Dickson	Port Hope.
Manvers	Alfred Ryley	Bethany.
DURHAM W.	Richard Windatt	Bowmanville.
Cartwright	James Parr	Blackstock.
Clarke	Robert Moment	Orono.
Darlington	Richard Windatt	Bowmanville.
ELGIN E.	John A. Kains	St. Thomas.
Bayham	W. Watts	Vienna.
Dorchester S.	George McKellar	Belmont.
Malahide	J. B. Ogilvie	Aylmer.
Yarmouth	W. G. Sanders	St. Thomas.
St. Thomas Horticultural Society	John A. Kains	St. Thomas.
Springfield Horticultural Society	J. B. Lucas	Springfield.
ELGIN W.	Alex. McCallum	Wallacetown.
Aldborough	A. Humphrey	Rodney.
Southwold and Dunwich.	Daniel Black	Iona Station.
ESSEX N.	T. F. Kane	Maidstone.
Maidstone and Sandwich	T. F. Kane	Maidstone.
Rochester and Maidstone	George Leak	Woodslee.
Sandwich E. & W., and Windsor and Sandwich	George K. Prowse	Windsor.
Tilbury W.	John Taylor	Comber.
ESSEX S.	S. T. Copus	Kingsville.
Colchester N.	A. E. Jones	Essex Centre.
Colchester S.	John Richmond	Harrow.
Gosfield N. & S., and Kingsville	S. G. Wigle	Ruthven.
Malden and Anderdon		
Mersea	Edward Nash	Leamington.
Leamington Horticultural Society	W. G. Morse	Leamington.
FRONTENAC	J. P. Oram	Kingston.
Kingston.	J. L. Haycock	Cataraqui.
Storrington.	Alexander Ritchie	Inverary.
Wolfe Island	S. Going	Wolfe Island.
GLENGARRY	G. H. McGillivray	Williamstown.
Kenyon	A. J. Kennedy	Maxville.
GRENVILLE S.	T. R. Melville	Prescott.
Edwardsburgh	G. Fairbairn	Spencerville.
GREY E.	S. Damude	Flesherton.
Artemesia	James Brodie	Vandeleur.
Collingwood	Charles Pye	Clarksburg.
Euphrasia	James L. Wilson	Fairmount.
Holland	John McDonald	Chatsworth.
Osprey	D. Grant	Singhampton.
Proton	F. Nixon	Dundalk.
GREY N.	Thomas Gordon	Owen Sound.
Derby	Alexander Garvie	Kilsyth.
Keppel	Henry Atkey	Oxenden.
St. Vincent	R. Agnew	Meaford.
Sarawak	David Saunders	Presqu' Isle.
Sullivan	William Smith.	Desboro.
Sydenham	James Cannon, jr.	Annan.
Owen Sound Horticultural Society		
GREY S.	A. McKenzie	Durham.
Bentinck	Duncan Campbell	Hanover.
Egremont	W. T. Petrie	Holstein.
Glenelg	William Haskett	Markdale.
Normanby	W. H. Ryan	Mount Forest.
HALDIMAND	J. W. Sheppard	Cayuga.
Cayuga N.		
Rainham and Cayuga S.	R. A. Havill	Rainham.
Seneca and Oneida	F. A. Nelles	York.
Walpole	Andrew Rodgers	Jarvis.
HALTON	William Clements	Milton.
Esquesing	Lachlan Grant	Georgetown.

SECRETARIES OF SOCIETIES.

Societies.	Secretaries.	Post Office Address.
Halton.—*Continued.*		
Nassagaweya	James D. Strong	Moffat.
Nelson		
Trafalgar	G. H. Hardy	Oakville.
Hamilton	W. H. Bruce	Hamilton.
Hastings E.	P. R. Palmer	Belleville.
Hungerford	Thomas Graham, sr.	Tweed.
Thurlow	John Canniff	Cannifton.
Tyendinaga	Arthur McFarlane	Melrose.
Hastings N.	James Gay	West Huntingdon.
Bangor, Wicklow, Monteagle, etc.	Sanford Card	Maynooth.
Dungannon and Faraday	J. C. Jarman	L'Amable.
Mayo and Carlow	W. C. Parkhurst	Boulter.
Rawdon	G. D. Wiggins	Spring Brook.
Tudor and Cashel	Charles Donaldson	Millbridge.
Wollaston	H. L. Werden	Coe Hill Mines.
Hastings W.	B. Mallory	Frankford.
Belleville Horticultural Society	W. J. Diamond	Belleville.
Trenton Horticultural Society		Trenton.
Huron E.	Daniel Stewart	Brussels.
Grey	Daniel Stewart	Brussels.
Howick	Peter Hepinstall	Fordwich.
Morris	Hugh McQuarrie	Blyth.
Wroxeter Horticultural Society	Thomas B. Saunders	Wroxeter.
Huron S.	M. Y. McLean	Seaforth.
Hay	D. S. Faust	Zurich.
Stanley	James Armstrong	Varna.
Stephen and Usborne	A. G. Dyer	Exeter.
Tuckersmith	G. McAdam	Egmondville.
Huron W.	James Mitchell	Goderich.
Ashfield and Wawanosh W.	William McArthur	Dungannon.
Colborne	John Varcoe	Carlow.
*Hullett	William Jackson	Clinton.
*Turnberry	John Anderson	Belgrave.
Wawanosh E.	F. Anderson	Belgrave.
Wingham Horticultural Society	Samuel Youhill	Wingham.
Kingston	A. Shaw	Kingston.
Kent E.	A. J. Campbell	Thamesville.
Camden	J. Chapple	Dresden.
Harwich	John W. Gibson	Blenheim.
Howard	Duncan Cochrane	Ridgetown.
Orford	J. G. Crosby	Highgate.
Zone and Bothwell	Charles Baley	Bothwell.
Kent W.	W. G. Merritt	Chatham.
Chatham & Dover (united with Sombra)	William N. Ayres	Wallaceburg.
Raleigh	A. H. White	Chatham.
Romney	James W. Hodgson	Wheatley.
Tilbury E.	Joseph Funston	Tilbury Centre.
Lambton E.	Frank Kenward	Watford.
Bosanquet	William Wight	Widder.
Brooke and Alvinston	Alexander McPhail	Alvinston.
†Euphemia and Dawn	Isaac Unsworth	Florence.
Plympton and Wyoming	D. S. Robertson	Wyoming.
Warwick	W. H. Stewart	Warwick.
Lambton W.	William Mowbray	Box 16, Sarnia.
Enniskillen	J. L. Wilson	Wilsoncroft.
Moore	James Smith	Colinville.
Sarnia	Albert Duncan	Osborne.
Sombra (united with Chatham & Dover)	William N. Ayres	Wallaceburg.
Lanark N.	W. P. McEwen	Almonte.
Dalhousie	Robert Lee	McDonald's Corners.
Lanark	A. Rankin	Middleville.
Pakenham	A. H. Tait	Pakenham.
Lanark Village Horticultural Society	J. H. Bothwell	Lanark.
Lanark S.	J. G. Campbell	Perth.
Drummond	Peter S. McLaren	McGarry.
Montague	E. Chalmers	Smith's Falls.
Sherbrooke S.	W. E. Moore	Maberly.
Leeds N. & Grenville N.	John Cranston	Merrickville.
Elmsley S.	John Rabb	Lombardy.

* Attached also to Huron E. Electoral District.
† Attached also to Lambton W. Electoral District.

SECRETARIES OF SOCIETIES.

Societies.	Secretaries.	Post Office Address.
LEEDS, Etc.—*Continued.*		
Kitley	J. G. Steacy	Frankville.
Oxford	John Conn	Kemptville.
LEEDS S.	L. N. Phelps	Phillipsville.
Bastard and Crosby		
Crosby N.	E. J. Hait	Newboro.
Lansdowne	G. F. Deane	Lansdowne.
Rear of Leeds and Lansdowne	James Berney	Lyndhurst.
Gananoque Horticultural Society	Freeman Britton	Gananoque.
LENNOX	George D. Hawley	Napanee.
Amherst Island	Wm. N. Montray	Stella.
Ernesttown	J. A. Timmerman	Odessa.
LINCOLN	Albert Pay	St. Catharines.
Clinton	Thomas R. Gilmore	Beamsville.
Grantham	Albert Pay	St. Catharines.
Grimsby N.	James Brodie	Grimsby.
Grimsby S.	W. H. Morgan	Smithville.
Louth	J. H. Kratz	Jordan.
LONDON	Thomas A. Browne	London.
MIDDLESEX E.	A. R. Rowat	Nilestown.
Dorchester N.	A. R. Rowat	Nilestown.
London	E. Ironside	Ilderton.
Nissouri W.	E. Nicholson	Thorndale.
Westminster	John Thornicraft	Lambeth.
MIDDLESEX N.	D. A. Stewart	Ailsa Craig.
Adelaide	J. M. Henderson	Adelaide.
Biddulph	W. B. Stewart	Granton.
Lobo	Alexander Gray	Coldstream.
McGillivray	W. Wright	West McGillivray.
Williams E.	A. C. Stewart	Ailsa Craig.
Williams W.	A. M. Miller	Parkhill.
MIDDLESEX W.	F. F. Evans	Strathroy.
Caradoc	W. E. Sawyer	Mount Brydges.
Delaware	J. Bowles	Delaware.
Ekfrid	Alexander Douglas	Melbourne.
Metcalfe	John Hutton	Napier.
Mosa	J. S. Walker	Glencoe.
Strathroy Horticultural Society	Edward A. Whyte	Strathroy.
*Muncey Indians	Scobie Logan	Middlemiss.
*Oneida Indians	J. T. Schuyler	Southwold.
MONCK	Dilly C. Holmes	Wellandport.
Monck Western Branch	J. H. Smith	Dunnville.
Caistor	I. Springstead	Abingdon.
Canboro	N. R. Teeft	Canboro.
Gainsborough	S. Kennedy	St. Ann's.
Pelham	Augustus Hyatt	Pelham Centre.
Wainfleet	Elmon Misener	Marshville.
MUSKOKA	E. F. Stephenson	Bracebridge.
Cardwell (united with Humphrey)	William Ditchburn	Rosseau.
Chaffey		
McLean and Ridout	Richard H. Salmon	Baysville.
Medora and Wood	R. G. Penson	Port Carling.
Morrison and Ryde	James Young	Severn Bridge.
Muskoka and Gravenhurst	W. R. Tudhope	Gravenhurst.
Stephenson	J. H. Osborne	Parkersville.
Stisted	Thomas Yearley	Yearley.
Watt	H. W. Gill	Ufford.
NIAGARA	Alexander Servos	Niagara.
NORFOLK N.	J. T. Murphy	Simcoe.
Middleton	J. F. Cohoe	Ronson.
Townsend	A. R. Ewing	Waterford.
Windham	Oliver Robertson	Windham Centre.
NORFOLK S.	Henry W. Mabee	Vittoria.
Charlotteville	John V. Watts	Walsh.
Houghton	John Malcolm	Houghton Centre.
Walsingham N.	George Cruise	Langton.
Walsingham S.	James L. Layman	Walshingham Centre.
Woodhouse	W. S. Sovereign	Port Dover.
NORTHUMBERLAND E.	R. P. Hurlbut	Warkworth.
Brighton	A. A. Becker	Hilton.
Cramahe	George Sanderson	Colborne.
Murray	S. D. Rightmyer	Wooler.

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* Not attached to the Electoral District Society.

SECRETARIES OF SOCIETIES.

Societies.	Secretaries.	Post Office Address.
NORTHUMBERLAND—*Continued.*		
Percy	R. P. Hurlbut	Warkworth.
Seymour	John Clark	Campbellford.
NORTHUMBERLAND W.	Richard Cullis	Camborne.
Alnwick	W. J. Varcoe	Roseneath.
Haldimand		
Hamilton	John Williams	Camborne.
ONTARIO N	E. J. Breen	Uxbridge.
Brock	T. H. Glendinning	Sunderland.
Mara and Rama	Edward Lanigan	Atherley.
Reach Scugog and Port Perry	William Spence	Manchester.
Scott	Thomas Cain	Sandford.
Thorah	George Smith	Beaverton.
Uxbridge		
ONTARIO S.	W. R. Howse	Whitby.
Pickering	F. A. Beaton	Whitevale.
Whitby and E. Whitby		
OXFORD N.	W. P. McClure	Woodstock.
Blandford	John Beattie	Innerkip.
Blenheim	D. A. Hoggarth	Drumbo.
Nissouri E.	John Henderson	Kintore.
Zorra E.	William Russell	Tavistock.
Zorra W. and Embro.	D. R. Ross	Embro.
OXFOBD S.	Alexander McFarlane	Otterville.
Dereham	Thomas T. Brown	Tilsonburg.
Norwich N.	J. H. Farrington	Norwich.
Norwich S.	Alexander McFarlane	Otterville.
Oxford E.	S. C. Tuttle	Oriel.
Oxford N. and W.	Joseph W. Holmes	Ingersoll.
PARRY SOUND	D. Macfarlane	Parry Harbour.
Armour	John Wilson	Burk's Falls.
Chapman	Richard Irwin	Maganetawan.
Himsworth N.	Edward Fisher	Callendar.
Himsworth S.	Wm. Carmichael	Powasson.
Humphrey (united with Cardwell)	William Ditchburn	Rosseau.
McKellar	James Kydd	McKellar.
Hagerman and Croft McKenzie and Ferrie	Thomas Butler	Dunchurch.
Machar	H. O. Boorse	South River.
Perry	E. B. Clearwater	Scotia.
Strong	Benjamin McDermott	Sundridge.
PEEL	Henry Roberts	Brampton.
Toronto	C. R. Colwell	Cooksville.
Toronto Gore	J. T. Peacock	Humber.
PERTH N.	John Brown	Stratford.
Easthope N.	George Bellinger	Wellesley.
Elma	John Morrison	Newry.
Mornington	Henry Gleiser	Milverton.
Wallace		
Stratford Horticultural Society		
PERTH S.	L. Harstone	St. Marys.
Blanshard	Robert Beatty	Kirkton.
Easthope S.	William Russell	Tavistock.
Fullarton	R. H. Pomeroy	Fullarton.
Hibbert	John Carmichael	Staffa.
Mitchell Horticultural Society	James N. Christie	Mitchell.
PETERBOROUGH E.	W. E. Roxburgh	Norwood.
Burleigh	D. Anderson	Apsley.
Douro and Dummer	W. Snelgrove	Warsaw.
Galway	George Rowlinson	Kinmount.
Otonabee	George Read	Keene.
*Peterborough and Ashburnham Horticultural Society	P. Henry	Peterborough.
PETERBOROUGH W.	Wm. Collins	Peterborough.
Monaghan S.	George L. Fair	South Monaghan.
Smith, Ennismore and Lakefield	M. S. Dean	Bridgenorth.
PRESCOTT	F. W. Thistlethwaite	Vankleek Hill.
Alfred	Mederic Gareau	Alfred.
Caledonia	H. J. Bradley	Fenaghvale.
Longueuil and E and W. Hawkesbury	John Shields	Vankleek Hill.
Plantagenet S.	A. McLean	Riceville.

* Attached also to Peterboro' W.

SECRETARIES OF SOCIETIES.

Societies.	Secretaries.	Post Office Address.
Prince Edward	Thomas Bog	Picton.
Ameliasburg	Edward Roblin	Ameliasburg.
Hallowell	Wm. B. Leavens	Chisholm.
Marysburg S.	William B. Head	Milford.
Sophiasburg	Samuel N. Smith	Demorestville.
Renfrew N.	John Brown	Beachburg.
*Grattan and Wilberforce	T. J. Quealy.	Eganville.
Pembroke, Stafford and Alice	H. W. Perrett	Pembroke.
Ross and Bromley	Robert Allan	Cobden.
Renfrew S.	Robert McLaren	Renfrew.
Lynedoch and Brudenell	James J. Fallon	Rockingham.
McNab	Peter Anderson	Harvey.
Arnprior Horticultural Society	George E. Neilson	Arnprior.
Renfrew Horticultural Society	W. Smallfield	Renfrew.
Russell.	Ira Morgan	Metcalfe.
Cambridge	William Cashin	Crysler.
Clarence	Gideon Menard	Clarence Creek.
Gloucester	J. J. Smyth	Billings' Bridge.
Osgoode	A. M. Stewart	Vernon.
Russell	W. R. Petrie	Russell.
Simcoe E.	Peter Murray	Orillia.
Medonte	Abe. Craig	Craighurst.
Oro	Archibald Campbell	Edgar.
Tiny and Tay	E. W. Murphy	Penetanguishene.
Orillia Horticultural Society	C. L. Stephens	Orillia.
Simcoe S.	R. T. Banting	Cookstown.
Essa	G. E. Wonch	Churchill.
Gwillimbury W. and Bradford	Robert Stewart	Bradford.
Innisfil	William Gregg	Churchill.
Tossorontio	J. C. Hart	Alliston.
Simcoe W.	R. J. Fletcher	Barrie.
Flos	Richard Middleton.	Elmvale.
Nottawasaga	J. W. Archer	Collingwood.
Sunnidale	E. Jakeway	Stayner.
Vespra	Geo. Sneath	Midhurst.
Barrie Horticultural Society	R. A. Douglas	Barrie.
Collingwood Horticultural Society	James Guilfoyle	Collingwood.
Stormont	H. McDiarmid	Avonmore.
Finch	Thomas Henry	Berwick.
Osnabruck		Osnabruck Centre.
Roxborough	Duncan McDermid	Avonmore.
Toronto	J. P. Edwards	Toronto.
Victoria N.	W. R. Cavana	Victoria Road.
Bexley and Carden	W. R. Cavana.	Victoria Road.
Eldon	John C. Gilchrist	Woodville.
Fenelon	J. D. Naylor	Fenelon Falls.
Laxton, Digby and Longford		
Rama, Dalton and Ryde	Thomas Cooper	Cooper's Falls.
Somerville	John G. Morris	Coboconck.
Victoria S.	James Keith	Lindsay.
Emily	G. A. Balfour	Omemee.
Mariposa	J. F. Cunnings	Oakwood.
Ops	James Keith	Lindsay.
Verulam	R. Ventress	Bobcaygeon.
Waterloo N.	Benjamin Devitt	Waterloo.
Wellesley	George Bellinger	Wellesley.
Woolwich	J. B. Winger	Elmira.
Berlin Horticultural Society		
Waterloo S.	Richard Blain	Galt.
Wilmot	Frederick Holwell	Baden.
Hespeler Horticultural Society	John Cunningham	Hespeler.
Preston Horticultural Society	F. J. Bittman	Preston.
Welland.	Alexander Reid	Crowland.
Bertie	J. L. Pound	Ridgeway.
Crowland	Alexander Reid	Crowland.
Humberstone and Port Colborne	E. W. Fares	Port Colborne.
Stamford	H. D. Garner	Niagara Falls South.
Thorold	Samuel Smith	Thorold.
Wellington C.	John Mair	Elora.
Erin	J. W. Burt	Coningsby.
Garafraxa W.	Hugh McDonald	Belwood.

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* Attached also to Renfrew S.

SECRETARIES OF SOCIETIES.

Societies.	Secretaries.	Post Office Address.
Wellington C.—*Continued.*		
Luther E	James Reith	Grand Valley.
Nichol	J. C. Donaldson	Fergus.
Pilkington	Alexander Kerr	Elora.
Elora Horticultural Society	John Bain	Elora.
Fergus Horticultural Society	T. J. Hamilton	Fergus.
Wellington S.	William Laidlaw	Guelph.
Eramosa	Robert Dredge	Rockwood.
Guelph amalgamated with S. Wellington E. D.	William Laidlaw	Guelph.
Puslinch	William Rae	Arkell.
Wellington W.	J. Robertson	Harriston.
Arthur	William W. White	Arthur.
Maryborough	Edward Dynes	Moorefield.
Minto	J. Robertson	Harriston.
Peel and Drayton	L. R. Adams	Drayton.
Clifford Horticultural Society	R. Daly	Clifford.
Mount Forest Horticultural Society		
Palmerston Horticultural Society	William Jamieson	Palmerston.
Wentworth N.	J. M. Knowles	West Flamboro.
Beverly	David Bell	Rockton.
Flamborough E.	Wm. Attridge	Waterdown.
Flamborough W.	John F. Green	Dundas.
Wentworth S.	Daniel Reed	Glanford.
Ancaster	John J. Bowman	Hamilton.
Barton	Robert D. Bensley	Hamilton.
Binbrook	James Barclay	Binbrook.
Glanford	Asa Choat	North Glanford.
Saltfleet	Erland Lee	Stony Creek.
York E.	James J. Baker	Markham.
Markham	John F. Davison	Unionville.
Scarborough	Alexander McCowan	Danforth.
York N.	E. Jackson	Newmarket.
Georgina and N. Gwillimbury	Mrs. Paterson	Sutton West.
Gwillimbury E.	J. J. Terry	Queensville.
King	Jos. Hollingshead	Schomberg.
Whitechurch	Hiram Johnston	Stouffville.
York W.	T. F. Wallace	Woodbridge.
Vaughan	T. F. Wallace	Woodbridge.
*York	John Cooper	Lansing.

OTHER SOCIETIES ORGANISED UNDER THE ACT.

Societies.	Secretaries.	Post Office Address.
Agriculture and Arts Association	Henry Wade	Toronto.
Bee-keepers' Association	W. Couse	Streetsville.
Creameries Association	R. J. Graham	Belleville.
Dairymen's Association (Eastern)	Harford Ashley	Belleville.
Dairymen's Association (Western)	C. E. Chadwick	Ingersoll.
Entomological Society	W. E. Saunders	London.
Fruit Growers' Association	Linus Woolverton	Grimsby.
Poultry Association	J. M. Hern	Bowmanville.

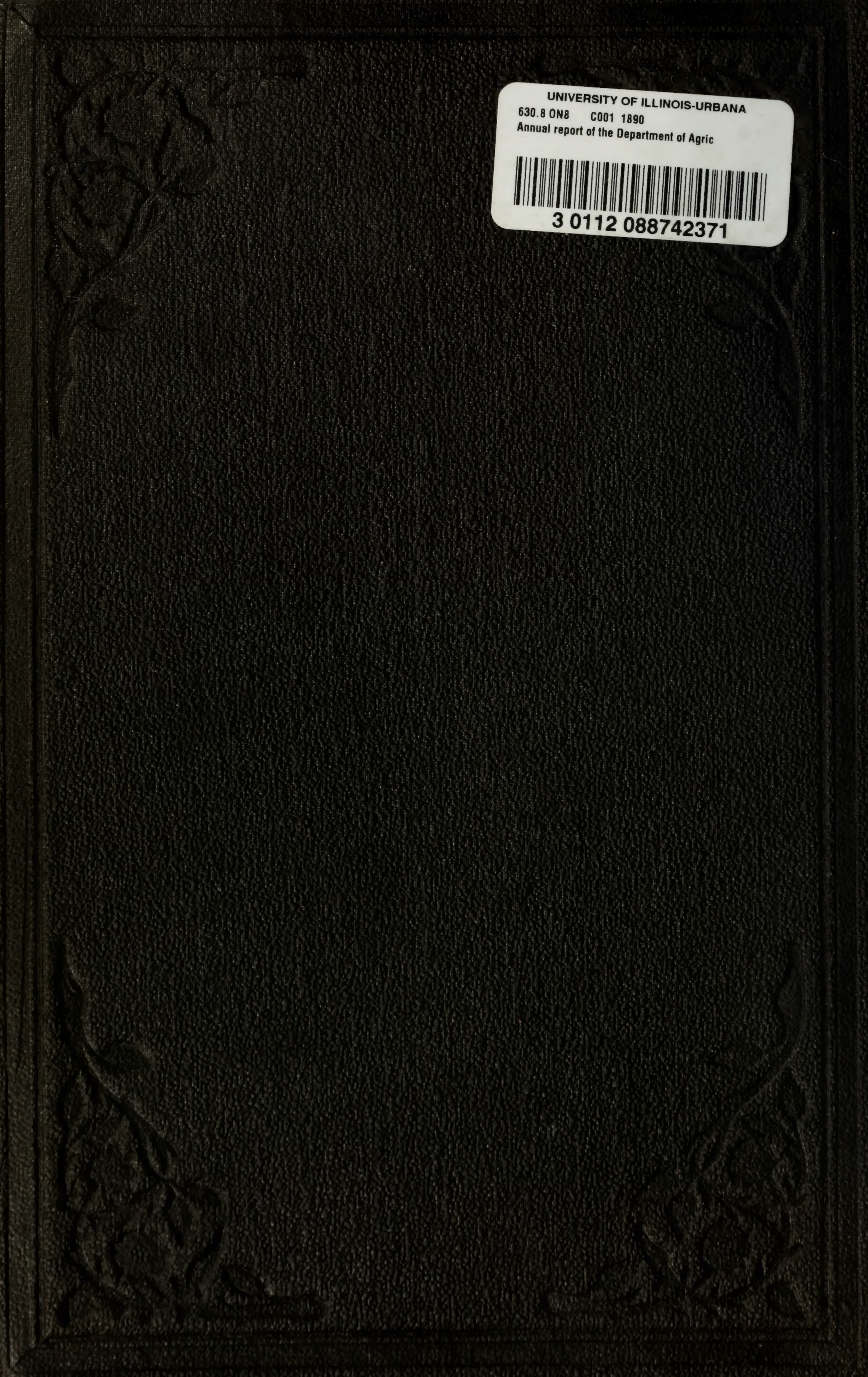
SECRETARIES OF FARMERS' INSTITUTE.

Electoral Districts.	Secretaries.	Post Office Address.
Addington	J. B. Aylesworth	Newburgh.
Algoma E.	Fred. Leighfield	Thessalon.
do.	John Dawson	Sault Ste Marie.
Brant N.	Henry R. Nixon	St. George.
Brant S.	Thomas A. Good	Brantford.
Brockville	Bethuel Loverin	Athens.
Bruce C.	William Bowes	Pinkerton.

* Attached also to York E.

SECRETARIES OF FARMERS' INSTITUTE.

Electoral Districts.	Secretaries.	Post Office Address.
Bruce N.	John Douglass	Tara.
Bruce S.	James A Lamb	Walkerton.
Carleton	R. H. Grant	Hazledean.
Dufferin	George Island	Orangeville.
Dundas	G. D. Dixon	Dixon's Corners.
Durham W.	Peter Werry	Tyrone.
Elgin E.	J. C. Dance	Kingsmill.
Elgin W.	Daniel Black	Iona Station.
Essex N.	N. J. Clinton	Windsor.
Essex S.	G. W. Coatsworth	Kingsville.
Frontenac	Alexander Ritchie	Inverary.
Glengarry	W. J. McNaughton	Lancaster.
Grenville S.	W. H. Thompson	Prescott.
Grey C.	J. I. Graham	Vandeleur.
Grey N.	H. W. Jenkins	Owen Sound.
Grey S.	George Binnie	Bunessan.
Haldimand.	Charles Walker	Cayuga.
Halton.	A. W. Peart	Freeman.
Hastings E.	John Stokes.	Thomasburg.
Huron E.	Arch. Hislop	Walton.
Huron S.	John Hannah	Seaforth.
Huron W.	William Howell	Carlow.
Kent E.	A. J. Campbell	Thamesville.
Kent W.	Jno. Clarkson	Chatham.
Lambton E.	Joseph Osborne	Wyoming.
Lanark N.	John Steele	Bennie's Corners.
Lanark S.	George Oliver	Perth.
Leeds S.	Freeman Britton	Gananoque.
Lennox	Marshall Bogart.	Napanee.
Lincoln	Roland W. Gregory	St. Catharines.
Middlesex E.	Thomas Baty	Wilton Grove.
Middlesex N.	F. H. Neil.	Lucan.
Middlesex W.	A. McTaggart	Appin.
Monck.	J. E. Cohoe	Wellandport.
Muskoka	Alex. Barron	Bracebridge.
Norfolk N.	F. L. Culver	Waterford.
Norfolk S.	Albert Gilbert	Simcoe.
Northumberland E.	J. B. Ewing	Dartford.
Northumberland W.	Richard Cullis	Camborne.
Ontario N.	Thomas Allen	Greenbank.
Ontario S.	Ellsworth Annis	Oshawa.
Oxford N.	James Anderson	Strathallan.
Oxford S.	M. S. Schell	Woodstock.
Parry Sound	D. Macfarlane	Parry Sound.
Peel	F. J. Sleightholm	Humber.
Perth N	Wm. Keith	Listowel.
Perth S.	P. S. Armstrong	St. Marys.
Peterborough E.	John W. Clark	Norwood.
Peterborough W.	John A. Davidson	Peterborough, Box 688.
Prescott	William McAdam.	Vankleek Hill.
Prince Edward	Alfred S. Yarwood	Picton.
Renfrew S.	John Park	Renfrew.
Russell	W. R. Craig	Russell.
Simcoe C.	G. C. Caston	Craighurst.
Simcoe E.	R. Miller	Hobart.
Simcoe S.	H. B. Jeffs	Bondhead.
Simcoe W.	W. A. Furlong	Nottawa.
Stormont	C. W, Young	Cornwall.
Victoria E.	Wm. Thurston.	Bobcaygeon.
Victoria W.	James Keith	Lindsay.
Waterloo N.	John F. McKay	Bloomingdale.
Waterloo S.	William Cowan	Galt.
Welland	E. Morden	Niagara Falls South.
Wellington C.	George Wright	Elora.
Wellington S.	P. Mahon	Aberfoyle.
Wellington W.	James McEwing	Drayton.
Wentworth N.	Joseph Stephenson.	Freelton.
Wentworth S.	Erland Lee	Stony Creek.
York E.	T. M. Whiteside	Ellesmere.
York N.	R. W. Phillips	Newmarket.
York W.	R. L. Crawford	Richview.
Permanent Central Institute	A. H. Pettit	Grimsby.



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